ALASKAN ARCTIC GAS PIPELINE COMPANY

CANADIAN ARCTIC GAS PIPELINE LIMITED

ArcticGas

ALIGNMENT SHEETS

AND

FLOW DIAGRAMS

INTERIOR ALTERNATIVE PIPELINE ROUTE

PRUDHOE BAY TO TRAVAILLANT LAKE JUNCTION

VIA THE MARSH FORK OF THE CANNING RIVER

ALIGNMENT SHEETS

INTERIOR ALTERNATIVE PIPELINE ROUTE

PRUDHOE BAY TO TRAVAILLANT LAKE JUNCTION

VIA THE MARSH FORK OF THE CANNING RIVER

For

ALASKAN ARCTIC GAS PIPELINE COMPANY
CANADIAN ARCTIC GAS PIPELINE LIMITED

PREPARED BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

DESCRIPTION OF ALIGNMENT SHEETS AND OVERLAYS

This volume contains a group of photomosaic strip maps — called "Alignment Sheets" — which shown the area proposed to be traversed by the proposed pipeline. The proposed location of the pipeline and related facilities are shown on each sheet, and the sheets contained in this volume show the complete route over the area covered by this volume, with the top sheet covering the most western or northern end of the area, with following sheets moving to the east or south.

The other data which appear on each Alignment Sheet, and the Environmental overleaf sheets which accompany Alignment Sheets, are described hereinafter.

ALIGNMENT SHEETS

The sheet following this sheet is a Master Index Map, (a small version of which is set forth on the lower right hand corner of each Alignment Sheet), and each Alignment Sheet may be located on such map. The Master Index Map has the route divided into large sections, each of which is identified by numbers and letters, such as 3B. These Sections are 3B, 1D and 1F.

Within each such Section, each Alignment Sheet has been assigned an arabic numberal, so that a given Alignment Sheet can be identified by a designation such as sheet 5 of Section 3B on the Master Index Map.

Such designation is carried over to each Alignment Sheet, since the above described designation on the Map relates to the first and the last parts of the nine digit drawing number which appears in the bottom right hand corner of each Alignment Sheet. For example, Alignment Sheet 3B-0200-1005 is the one described earlier as sheet number 5 of Section 3B on the Master Index Map.

ACCURACY OF SCALE

The mosaic sections of the Alignment Sheets are uncontrolled, which means that no corrections have been made for variations in flying altitude, airplane tilt, or distortion caused by mountainous terrain. As a result, the nominal horizontal scale of 1" - 2000' shown on the Alignment Sheets is only approximate. The scale for each Alignment Sheet was checked against topographical maps, and the horizontal scale accuracy, expressed as a percentage was calculated for each individual sheet. A weighted average was then calculated for the line sections composed of the groups of Alignment sheets listed below. For example, the overall accuracy of the Alignment Sheets covering the line from about Fort McPherson to the Travaillant Lake Junction (Sheets 1F-0200-1001 to 3B-0200-1006) is - 0.7%. It should be emphasized that this inaccuracy applies only to the mosaic sections of the Alignment Sheets and not to the pipeline mileages, which were scaled from government topographical maps and transferred to the mosaics.

Alignment Sheets	Horizontal Scale Accuracy
3B-0200-1001 to 3B-0200-1027	-2.8%
1D-0200-1001 to 1D-0200-1014	-1.6%
1F-0200-1001 to 1F-0200-1006	-0.7%

AERIAL PHOTOGRAPHY

The aerial photography used to produce the mosaic has been obtained since 1970, except for some short Sections where older government photography was used. The photography is primarily at a scale of 1" = 2000'. Where larger scale photography was used, scale adjustments were made so that the resultant mosaics all have the same nominal horizontal scale.

ALIGNMENT SHEET DATA

The following information appears on the Alignment Sheets:

1. Pipeline and Facilities Location

   The facilities referred to are pipeline compressor stations, meter stations, mainline block valves, airstrips, and associated access roads. Pipeline mileposts are also shown.

2. Terrain and Soils Information

   Airphoto interpreted terrain typing has been mapped on the photomosaic portion of the Alignment Sheets. An abbreviated legend which appears on the sheets defines the symbols used. Drill hole locations, logs and legends are also shown on the Alignment Sheets. A description and analysis of the terrain typing and the confirming borehole data is presented in other Sections of the application.

3. Borrow Areas, Staging Areas, Access Roads

   The borrow areas, staging areas, and associates permanent and temporary access roads planned by the Applicant have been shown in those situations in which they appear within the area covered by the mosaic. These locations are also shown in other Sections of the application.

4. Profile

   An approximate pipeline profile is shown on each Alignment Sheet at a horizontal scale of 1" = 2000' and a vertical scale of 1" - 200'. This profile was plotted from government topographical maps.

5. Erosion Control Categories

   The category of erosion control measure applicable to the area shown on the mosaic is stated on each sheet. An explanation of the parameters that were used to select the categories of erosion control measures and a description of those categories, appears in other Sections of the application.

6. Areas of Potential Buoyancy

   The buoyancy condition and design solution applicable to the area shown on the mosaic is stated on each sheet. A description of potential buoyancy conditions and design solutions relative thereto appears in other Sections of the application.

7. Revegetation Categories

   Right-of-way revegetation technique code numbers appear on the Alignment Sheets. Those numbers, related to categories of materials to be used, and techniques to be applied for purposes of revegetation. Such materials and techniques are described in other Sections of the application.

8. River Crossing Reference Drawings

   Reference drawing numbers are shown on the Alignment Sheets for river and stream crossings. These reference drawings appear at the back of this Alignment Sheet volume.

   Erosion control and buoyancy measures relative to the crossing are indicated or referred to on the river crossing drawings.

9. Depth of Cover

   Minimum depth of cover over the pipeline is shown on the Alignment Sheets as a general note. The factors upon which depth of cover is dependent appear in other Sections of the application.

10. Mapping Co-ordinate System

    The Universal Transverse Mercator Grid System is shown on all Alignment Sheets.

ENVIRONMENTAL DATA SHEETS

The second copy of the Alignment Sheets are Environmental Data Sheets which indicate environmental information relative to the area covered by the mosaic, including any specific environmental concerns and the related protective measure. Such information covers vegetation, birds, fish, mammals, archeology and current human land use.

Unless otherwise stated, the comments on the data sheets are applicable to a zone which is approximately 2,000 feet wide, on either side of the pipeline route, and which extends the full length of the sheet on which the comments appear. Vertical lines appearing in the comment space indicate a boundary for comment applicability when a comment covers less than the full length of the sheet. Absence of comment indicates as area of relatively low sensitivity.

PRINT REDUCTION AND SCALE

All Alignment Sheets contained in this volume have been photo-reduced from originals which were larger than these prints. The nominal scale on the original drawings is 1" = 2000'. The nominal scale on the prints in this volume is 1" = 2530'.

On each print, a bar scale appears in the lower right corner, above the title block. The bar scale is correct and may be used to scale distances in the photomosaic.

A. DRILL HOLE DATA

1. DATA PRESENTATION

A – Drill hole number.

B – Temperature probe installation number.

C – Date coring made.

D – Soil and bedrock description (see Section B, "Soil Description")

E – Depth in feet of strata changes, and symbolic representation of soil and bedrock.

F – Permafrost Conditions:
column shaded – indicates frozen soil.
column unshaded – indicates unfrozen soil.
---- indicates interpreted depth of active layer.
Frozen soil described in accordance with NRC permafrost description system (see Section C).

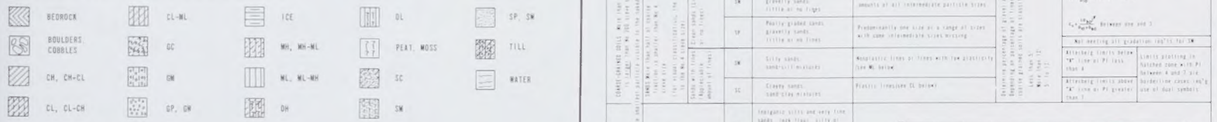
G – Water or ice content expressed in percent of dry weight of soil solids.

* – indicates boring made in area exhibiting surface disturbances (e.g. cleared areas, seismic lines, winter roads).

NOTES:
1. A double line at the bottom of the drill hole column indicates "Refusal" (i.e. the drill could not penetrate further).
2. The drill hole data is not plotted to scale, but the water or ice content determinations are shown in their true relative position within a given stratum.

2. GRAPHIC SOIL SYMBOLS

See Section B for explanation of soil description terms and symbols



3. SOURCES OF DRILL HOLE DATA

DRILL HOLE NUMBERS	DATE PERFORMED	TYPE OF DRILLING
2 – 282	Feb. – April, 1971	Rotary (air)
285-497	June – July, 1971	Auger
1000 series 2000 series 3000 series 4000 series	July – Aug, 1972	Auger
5000 series 6000 series 7000 series	Aug. – Sept, 1972	Rotary (air)
2A – 69A	Aug. – Nov. 1970	Auger
5NCPC – 373NCPC	Feb. – April, 1972	Auger
72C series	Feb. – April, 1972	Rotary (air)
A2-A114	June – July, 1971	Auger
B – series	Sept – Nov. 1969	Rotary (air)
H72 series	Aug. – Sept. 1972	Auger
N series	June – July, 1971	Auger
N73 series	May – June, 1973	Auger
P series PA series	Feb. – April, 1971	Rotary (air)
PRS series	October, 1970	Auger, Drive Sampling
R series	Feb. – April, 1971	Auger
AG series	July – Oct. 1973	Auger

NOTES:

1. Drill hole data is shown on the alignment sheets only for those drill holes which are within or near the mosaic area on the alignment sheets.
2. The drill hole numbers are shown above as they appear on the alignment sheets.

B. SOIL DESCRIPTION

1 SOIL IDENTIFICATION SYSTEM

The soil descriptions obtained from the drilling programs described in section A.3 have been converted into abbreviated soil descriptions on the alignment sheets using the Unified Soil Classification (USC) system symbols (see section B.2). The soil descriptions appear in area D of the boring column (see Section A-1). The classification is given in bold type, and data which modifies or augments the basic USC symbol appears in lighter type. The terms which modify or augment the USC descriptions are based on a system of soil identification developed by D. Burmister. An abbreviated description of the Burmister system is presented in Section B-3. The abbreviation and terms used which are not covered by the two systems are listed in Section B-4.

2 UNIFIED SOIL CLASSIFICATION SYSTEM

A complete description of the USC system of soil classification will be found in Reference 1, described in Section B.5 below. Descriptions of this system will also be found in References 2 and 3.

UNIFIED SOIL CLASSIFICATION (including identification and description)					
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (excluding particles larger than 3 inches and basing fractions on estimated weights)
COARSE-GRAINED SOILS More than half of material is larger than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. The 3 inch size is about the smallest gravel visible to the naked eye.	Clean Gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Wide range in grain size and substantial amounts of all intermediate particle sizes.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.
		Gravels with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.	Nonplastic fines or fines with low plasticity (see ML below).
			GC	Clayey gravels, gravel-sand-clay mixtures.	Plastic fines (see CL below).
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. The 3 inch size is about the smallest sand grain visible to the naked eye.	Clean Sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.	Wide range in grain size and substantial amounts of all intermediate particle sizes.
			SP	Poorly-graded sands, gravelly sands, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.	Nonplastic fines or fines with low plasticity (see ML below).
			SC	Clayey sands, sand-clay mixtures.	Plastic fines (see CL below).
FINE-GRAINED SOILS More than half of material is smaller than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	
			OL	Organic silts and organic silty clays of low plasticity.	
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silts.	
			CH	Inorganic clays of high plasticity, fat clays.	
			OH	Organic clays of medium to high plasticity, organic silts.	
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.	

LABORATORY CLASSIFICATION CRITERIA

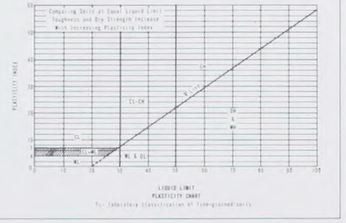


Fig. Laboratory classification of fine-grained soils

NOTES:

1. The above chart has been adapted from Table I in Reference 1, below.
2. Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well-graded sand-gravel mixture with clay binder.
3. Clay soils of intermediate or medium plasticity (i.e., liquid limit between 30 and 50) are indicated by the compound symbol CL-CH. Clay soils with a liquid limit greater than 50 but less than 55 are indicated by the compound symbol CH-CL.
4. All sieve sizes on the above chart are U.S. standard.

3 BURMISTER SOIL IDENTIFICATION SYSTEM

The Burmister soil identification system has been used to augment or modify the USC symbols. These modifying terms appear in lighter type in the descriptions. The chart presented below summarizes the elements of the Burmister system which appear on the alignment sheets. A complete description of this system can be found in Reference 4, listed below.

Definitions of Terms Identifying The Composition of Granular Soils						Definitions of Terms Identifying The Gradation of Granular Components		
Component	Identification		Terms Identifying Proportions		Defining Range of Percentages by Weight	Gradation Designation for Identification		Defining Proportions
	Written	Symbol	Written	Symbol		As Written	Symbol	
Principal component	GRAVEL SAND SILT	G S Si	—	—	50 or more	coarse to fine or coarse medium to fine	cf cm	All fractions greater than 10 per cent of the component, but the medium component predominates.
Minor component	Gravel Sand Silt	g s si	and some little trace	a- s- l- t-	35 to 50 20 to 35 10 to 20 1 to 10	coarse to medium medium to fine medium fine	cm mf m f	less than 10 per cent fine less than 10 per cent coarse less than 10 per cent coarse and fine less than 10 per cent coarse and medium

NOTES: (1) The chart has been adapted from Table II in Reference 4.

B. SOIL DESCRIPTION

4 ABBREVIATIONS USED FOR SOIL DESCRIPTIONS

BDRK	Bedrock	lnsd	Lensed	SHL	Shale
bldr(s)	boulder(s)	lyrd	Layered	sm(s)	seam(s)
cbl(s)	cobble(s)	Mo	Moss	SS	Sandstone
cvr	cover	org	organic	St	Siltstone
fgmt(s)	fragment(s)	Pt	Peat	veg	Vegetation
Gs	Grass	rt(s)	root(s)	vvd	varved
wd	wood	Wx	Weathered (bedrock)		

NOTE:

In those instances where the field personnel have identified a stratum as TILL on the boring logs, this term has been included in the stratum description on the alignment sheets. Where the stratum has been identified as "TILL-like", it has been noted as "TILL" on the alignment sheets. Till is a geological term describing soil deposited by glacial action which characteristically consists of a heterogeneous mixture of clay through gravel soil sizes, containing varying amounts of cobbles and boulders.

5 REFERENCES

(1) UNIFIED SOIL CLASSIFICATION SYSTEM, TECHNICAL No. 3-357, prepared for Office, Chief of Engineers by Waterways Experimental Station, Vicksburg Mississippi, Corp of Engineers, U.S.A. Army; Volume 1, March 1953

(2) Wagner, A.A., "Classifying Soils by Unified Soil Classification System; in PROCEDURES FOR TESTING SOILS, published by American Society for Testing and Materials, Philadelphia, Pa; Fourth Edition (revised), 1963; Chapter 1.

(3) EARTH MANUAL; prepared by Bureau of Reclamation, U.S.A. Dept. of Interior, First Edition (revised), 1963; Chapter 1.

(4) Burmister, D.M., Identification of Soils; in PROCEDURES FOR TESTING SOILS; published by American Society for Testing and Materials, Philadelphia, Pa; Fourth Edition, December 1964, pp. 221-233.

C. PERMAFROST DESCRIPTIONS

1. GENERAL

The nature of the frozen soils encountered in the borings has been described in accordance with the N.R.C. system of permafrost description which can be found in Reference 1. This system is summarized in the tables, Section C.2 below. In some instances, these descriptions are given for frozen active layer soils; in other instances insufficient data was recorded on the boring logs to allow assignation of a permafrost category.

2. PERMAFROST DESCRIPTION SYSTEM

A. ICE NOT VISIBLE			
Group	Subgroup		
Symbol	Description		Symbol
N	Poorly bonded or friable		Nf
	No excess ice well-bonded	Non	Non
	Excess ice	Nbe	Nbe

B. VISIBLE ICE LESS THAN 1 INCH THICK		
Group	Subgroup	
Symbol	Description	Symbol
V	Individual ice crystal or inclusions	Vx
	Ice coatings on particles	Vc
	Random or irregularly oriented ice formations	Vr
	Stratified or distinctly oriented ice formations	Vs

C. VISIBLE ICE GREATER THAN 1 INCH THICK		
Group	Subgroup	
Symbol	Description	Symbol
ICE	Ice with soil inclusions	ICE
	Ice without soil inclusions	ICE

NOTES: (1) The above charts have been adapted from Table I in Reference 1

3 REFERENCES

(1) Philiahen, J.A., and Johnston, G.H., GUIDE TO A FIELD DESCRIPTION OF PERMAFROST FOR ENGINEERING PURPOSES TECHNICAL MEMORANDUM 79 (NRC 7576), published by Associate Committee on Soil and Snow Mechanics, National Research Council of Canada, Ottawa, Ontario, October 1963.

D. TERRAIN MAPPING

1. GENERAL

The terrain mapping presented on the alignment sheets was done by I.D. Mollard and Associates, Regina, Saskatchewan. This mapping was done using airphoto interpretation techniques including stereoscopic examination of aerial photography, review and analysis of available published geological and geographical information, and analysis of field boring data obtained for this project.

The terrain mapping generally outlines landforms, but, where the scale of the photography permits, the landform is further subdivided into "phases" (distinctly different expressions of the same basic landform) and "features" (secondary landform elements within a basic landform, e.g., sand dunes). In some cases two or more landforms may be so intimately associated that they cannot be separated at the scale of the photography used. This type of map unit is termed a "complex".

The terrain map unit symbols were generally created from the initial letters of the phrase describing the landform they designate. For example, "AFP" represents "Active Flood Plain"; "GLB" represents "Glacial Lake Basin". Other symbols are convenient abbreviations of the landform element, e.g., "TK" for the thermokarst features.

Each terrain map unit within a particular region (called a "physiographic division" –see below) is characterized by a data sheet which describes the nature of that unit in detail including: a description of the landform and its constituent materials, permafrost conditions, topography, vegetation, a stereoscopic pair of airphotos illustrating the terrain unit, the major diagnostic features used to identify the landform, a list of the boreholes made in the terrain unit, and estimate of the engineering properties of the materials comprising the landform, and drainage characteristics within the map unit. A complete assemblage of such data sheets is called a "terrain legend". For convenience, an abbreviated "Terrain Typing Legend", providing a brief description of the terrain map units, is presented on the right hand side of each alignment sheet.

Considerable variation in the nature of the materials comprising a landform can occur depending on the climate, topography and geology of a given region (e.g., mountainous vs. plains areas; sedimentary vs. igneous bedrock). In order that such variations could be taken into account, the terrain mapping is presented in regional segments called "physiographic divisions". These physiographic divisions are designated by roman numerals appearing at the top of the abbreviated terrain legend on the alignment sheets, and the location of these segments is shown on the "Master Index Map" prefacing the alignment sheets.

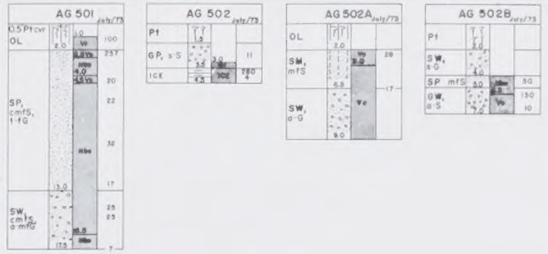
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

DRILL HOLE, SOIL DESCRIPTION
PERMAFROST DESCRIPTIONS
AND TERRAIN MAPPING

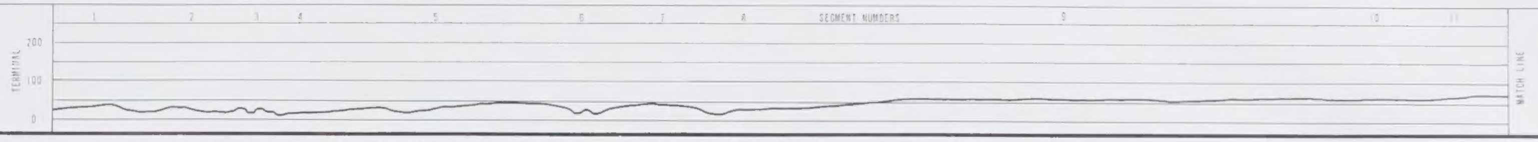

BEAUFORT SEA
AMUNDSEN GULF
VICTORIA ISLAND
BANKS ISLAND
PRINCE ALBERT PENINSULA
WOLLASTON PENINSULA
PRINCE OF WALES ISLAND
M'CLINTOCK CHANNEL
ALASKA
YUKON TERRITORY
NORTHWEST TERRITORIES
DISTRICT OF MACKENZIE
GREAT BEAR LAKE
GULF OF CORONATION
MELVILLE HILLS
PHILIP SMITH MTNS
DAVIDSON MTNS
BRITISH MTNS
MACKENZIE MOUNTAINS
Prudhoe Bay
Fort Yukon
Dawson
Fort Norman
Norman Wells
Fort Franklin
Coppermine
Cambridge Bay
Bathurst Inlet
Fort Collinson (site of)
Holman Island
Paulatuk
Tuktoyaktuk
Inuvik
Aklavik
Fort McPherson
Arctic Circle
Fort Good Hope
Port Radium
Sachs Harbour
Prince Albert Sound
Dease Strait
Victoria Strait
Coronation Gulf
Bathurst Inlet
SCALE
miles
32 16 0 32 64
LEGEND
3B DRAWING SECTION NUMBER
LOCATION AND NUMBER OF ALIGNMENT SHEET
VI PHYSIOGRAPHIC DIVISION NUMBER AND BOUNDARY
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY
CANADIAN ARCTIC GAS PIPELINE LIMITED
MASTER INDEX MAP
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA SHEETS
ALASKA, YUKON TERRITORY, NORTHWEST TERRITORIES
DATE JAN 16, 1974
PROJECT No.
DRAWING No. 3-0214-1009 -C
REV.

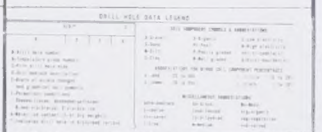
OWNERSHIP

DRILL HOLE DATA



PROFILE

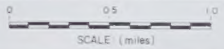




CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	PRUDHOE BAY TERMINAL MILE POST 00.00		4-0210-1099				4-0210-1099		4-0210-1099			MATCH LINE 7.16
CHAINAGE (miles)	00.00	0.67	1.16	1.31	1.61	2.66	2.73	3.64	3.74	6.42	6.72	7.16
DESIGN DATA												
SEGMENT Nº	1	2	3	4	5	6	7	8	9	10	11	
SEGMENT LENGTH	0.67	0.49	0.15	0.30	1.05	0.07	0.91	0.10	2.68	0.30	0.44	
EROSION CONTROL	EC-1D	EC-1D	N/A	EC-1C	EC-1C	N/A	EC-1C	N/A	EC-1C	EC-1D	EC-1D	
BUOY.	B-1	B-0	N/A	B-1	B-0	N/A	B-1	N/A	B-1	B-0	B-1	
REVEG.	I-V-8	I-V-8	I-V-5	I-V-8	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8			

FOOTAGE THIS SHEET



U.T.M. GRID ZONE 5

TERRAIN TYPING LEGEND

I -- LOWER COASTAL PLAIN PHYSIOGRAPHIC DIVISION (VIA CANNING RIVER)

Beaufort Coast to vicinity of Shaviovik River

TERRAIN TYPES

ACP	Arctic coastal plain: mainly thin to thick (up to about 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata; widespread wedge ice
AFP	Active flood plain: mainly exposed riverbed sand and gravel strata
AMP	Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel
FFP	Fossil flood plain: mainly thin ice-rich silty topstratum over silts to clean sand and gravel substrata
RSR	Smoothly rounded silt-mantled sloping regions: mainly interbedded eolian (silt) and colluvial (retransported organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

SD	Sand dunes, longitudinal
P	Pingos and hydrolaccoliths
IWP	Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

SP	Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
FOL	Former oriented lakes, now partly filled with peat and organic silt
SOL	Small oriented lakes and ponds, frequently subrectangular in outline
BD	Beaded drainage in areas of widely occurring ice-wedge polygons
L	Lakes, mainly oriented
AUF	Aufeis (flood icing) occurrences on active flood plains

Depth phases of ice-rich silty topstratum

d	5 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel strata

Buried substratum phases

TC	Tertiary conglomerate, sand and gravel below variable thickness of surficial ice-rich silt

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

PIPELINE LEGEND

CARRIER PIPE (cont. weld)	POINT OF INTERSECTION
CARRIER PIPE (cont. cover)	DRILL HOLE LOCATION
BERM BREAK	WARNING SIGN
SWAMP WEIGHT	MILEPOST SIGN AIRCRAFT
RIVER WEIGHT	CHAINAGE EQUATION
FROST ANCHOR	COMPRESSOR STATION
SCREW ANCHOR	AIR STRIP
HEAVY WALL PIPE	STORAGE OR STAGING AREA
CASING PIPE	CAMP SITE
ANCHOR BLOCK (concrete)	STAGING AREA & CAMP SITE
BLOCK VALVE	BORROW SITE
TEST LEAD & DIRECTION OF WIRES	WHARF

	PERMANENT ROAD
	TEMPORARY ROAD
HP	HELIPAD
M	MEASURING STATION
	COMMUNICATIONS TOWER
	SIDE VALVE
	WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN.	DESCRIPTION	REQ'N Nº

BUOYANCY AND EROSION CONTROL LEGEND

B-0	No buoyancy
B-1	Potential buoyant conditions along segment
B-2	Potential buoyant conditions along portions of the segment
N/A	Refer to river crossing drawing
EC-1	Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2	Average slope along segment greater than 3° Erodible soil. Close spaced control measures required
EC-3	Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
EC-4	Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC-5	Unstable natural course. Deeper burial required along segment
EC-6	Control measures required on steep sideslopes
EC-7	Control measures required at steep scarps
EC-8	Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
C-711	74 - 76
C 711	42 - 45
C 711	10 - 12

OPERATING LICENCE Nº	
CONSTRUCTION PERMIT Nº	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APPRO BY	APPRO BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P.

DOWNSTREAM M.P.

DRN. BY	DATE
CHKD. B.	
APPRO. BY	

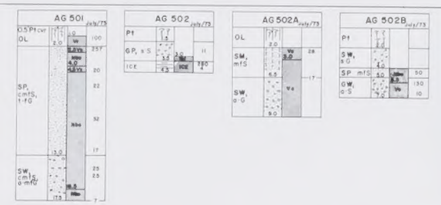
SCALE: 1" = 2000'

SHEET 1 OF 27

3B-0200-1001

OWNERSHIP

DRILL HOLE DATA



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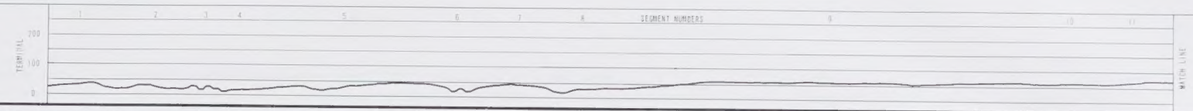


TERRAIN TYPING LEGEND

I — LOWER COASTAL PLAIN PHYSIOGRAPHIC DIVISION (VIA CANNING RIVER)

Beaufort Coast to vicinity of Shaviovik River

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to about 13 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata; widespread wedge ice

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel

FFP Fossil flood plain: mainly thin ice-rich silty topstratum over silty to clean sand and gravel substrata

RSK Smoothly rounded silt-mantled sloping regions; mainly interbedded eolian (silt) and colluvial (retransported organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

SD Sand dunes, longitudinal

P Pingos and hydrolaccolithe

IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil

FOL Former oriented lakes, now partly filled with peat and organic silt

SOL Small oriented lakes and ponds, frequently sub-rectangular in outline

BD Beaded drainage in areas of widely occurring ice-wedge polygons

L Lakes, mainly oriented

AGF Aufeis (flood icing) occurrences on active flood plains

Depth phases of ice-rich silty topstratum

4 3 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel strata

Buried substratum phases

TC Tertiary conglomerate, sand and gravel below variable thickness of surficial ice-rich silt

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH: Small drainage no winter flow. Small shallow ponds in this region - frozen in winter, although a few may be deep enough to support populations of sticklebacks.

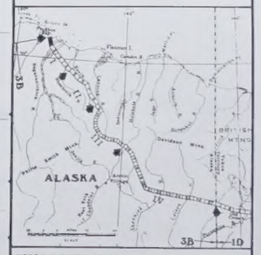
BIRDS: Lake and pothole area: limited habitat. Waterfowl and shorebirds: low risk to rare. Breeding, moulting and migration: May to August. Ground disturbance by ATV's will be restricted. Low level aircraft flights will be limited to right-of-way inspections.

MAMMALS: Winter range for small numbers of caribou; scattered spring movement and some calving; important part of summer range for 3,000 caribou, mainly east to west movements. Concentration on coastal areas during July and August. Occasional moose present during spring, summer and fall. Furbearers – arctic fox, ground squirrels and some short-tailed weasel, grizzly bear found during summer. Arctic fox dens located on pingos on former oriented lakes (FOL) terrain.

LAND USE: Putuligayuk Creek – Year round use by furbearers denning probable summer foraging by grizzly bear, possible denning area or travel route for polar bear.

VEGETATION: 0.00 | (LACTIC) Sedge - cottongrass, D. willow, including Jurecky sedge - V. willow rose | Hummocky sedge - D. willow - cassiope | Wet sedge meadow (Jurecky) D. willow | Sedge - D. willow cottongrass | Wet sedge meadow (Jurecky 1)

OTHERS: Archaeology high priority | Archaeology medium priority

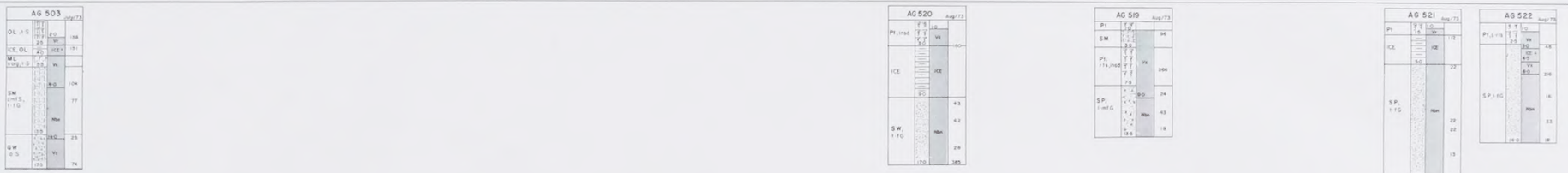


3B-0200-1001

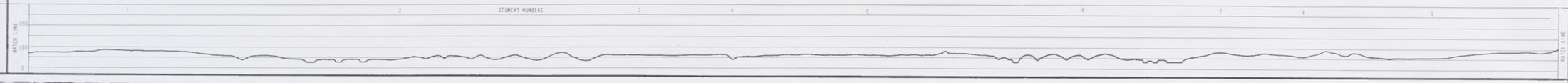
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



PROFILE



CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	MATCH LINE 7.16		4-0210-1095		4-0210-1093			4-0210-1094					MATCH LINE 20.81
CHAINAGE (miles)	00.00	2.23		5.58	6.37 / 6.42		8.78		10.43	11.23 / 11.28			13.05
DESIGN DATA													
SEGMENT No.	1		2		3	4	5		6	7	8		9
SEGMENT LENGTH	2.23		3.35		0.79	0.05	2.36		1.85	0.80	0.08		2.38
EROSION CONTROL	EC-10		N/A		EC-10	N/A	EC-10		N/A	EC-10	EC-8		EC-10
BUOY.	B-1		N/A		B-1	N/A	B-1		N/A	B-2	B-1		B-2
REVEG.	I-V-8	N/A	I-V-2		I-V-8			N/A	I-V-2	N/A	I-V-8	I-V-5	I-V-8

FOOTAGE THIS SHEET

0 0.5 1.0
SCALE: (miles)

U.T.M. GRID ZONE 8

TERRAIN TYPING LEGEND

I — LOWER COASTAL PLAIN PHYSIOGRAPHIC DIVISION (VIA CANNING RIVER)

Beaufort Coast to vicinity of Sheviorik River

TERRAIN TYPES

ACP Arctic coastal plain; mainly thin to thick (up to about 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata; widespread wedge ice

AFP Active flood plain; mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain; mainly thin ice-rich silty topstratum over alluvial sand and gravel

FFP Fossil flood plain; mainly thin ice-rich silty topstratum over silty to clean sand and gravel substrata

ESR Smoothly rounded silt-mantled sloping regional mainly interbedded colluv (silt) and colluvial (retransported organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

SD Sand dunes, longitudinal

P Pingos and hydrolaccoliths

IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil

FOL Former oriented lakes, now partly filled with peat and organic silt

SOL Small oriented lakes and ponds, frequently sub-rectangular in outline

BD Beaded drainage in areas of widely occurring ice-wedge polygons

L Lakes, mainly oriented

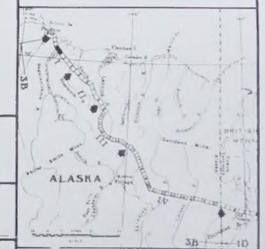
AOP Aufeis (flood icing) occurrences on active flood plains

Depth phases of ice-rich silty topstratum

d 5 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel strata

Buried substratum phases

TC Tertiary conglomerate, sand and gravel below variable thickness of surficial ice-rich silt



PIPELINE LEGEND

- 30 in. CARRIER PIPE (Dual Wheel)
- 48 in. CARRIER PIPE (Dual Wheel)
- SEWER BREAK
- BASKET WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- WATER HOLE
- TEST LEAD & JUNCTION BOX (dual)
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN (AIRCRAFT)
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQN. No.

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
N/A Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2 Average slope along segment greater than 3° Erodible soil. Erosion control measures required
EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC-5 Geotextile water course. Deeper burial required along segment
EC-6 Control measures required on steep sideslopes
EC-7 Control measures required at steep slopes
EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSUME HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION, ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL No.	PHOTO No.
C712	8 - 7
C711	158 - 161
C711	124 - 127

OPERATING LICENCE No.	
CONSTRUCTION PERMIT No.	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

No.	DATE	REVISION	APPRD. BY	APPRD. BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. DOWNSTREAM M.P.

DRN. BY	DATE		
CHKD. BY		SCALE: 1" = 2000'	
APPRD. BY		SHEET 2 OF 27	3B-0200-1002

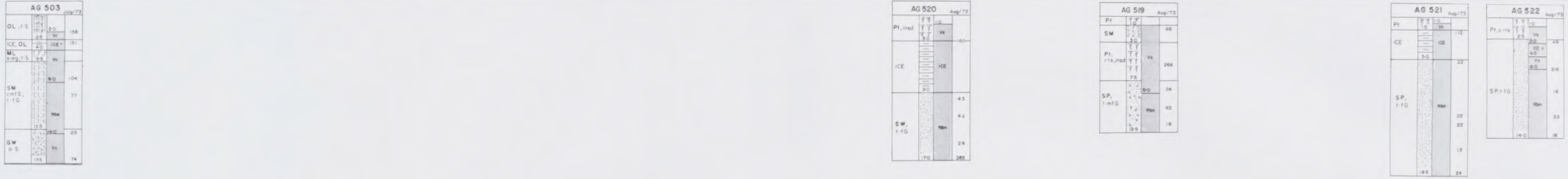
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

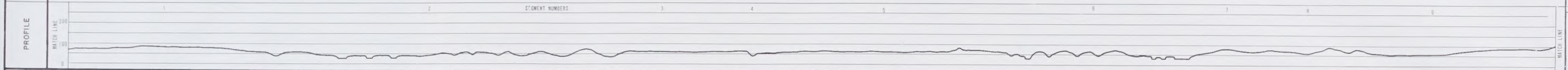
REGINA, SASK.

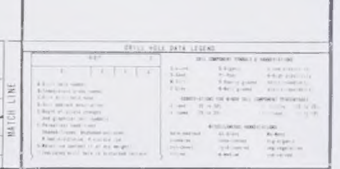
OWNERSHIP

DRILL HOLE DATA



PROFILE





TERRAIN TYPING LEGEND

I -- LOWER COASTAL PLAIN PHYSIOGRAPHIC DIVISION
(VIA CANNING RIVER)

Beaufort Coast to vicinity of Shaviovik River

TERRAIN TYPES

ACP	Arctic coastal plain: mainly thin to thick (up to about 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata; widespread wedge ice
AFP	Active flood plain: mainly exposed riverbed sand and gravel strata
AMP	Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel
FFP	Fossil flood plain: mainly thin ice-rich silty topstratum over silty to clean sand and gravel substrata
RSR	Smoothly rounded silt-mantled sloping regions: mainly interbedded eolian (silt) and colluvial (retransported organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

SD	Sand dunes, longitudinal
P	Pingos and hydrolaccoliths
IWP	Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

SP	Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
FOL	Former oriented lakes, now partly filled with peat and organic silt
SOL	Small oriented lakes and ponds, frequently subrectangular in outline
BD	Beaded drainage in areas of widely occurring ice-wedge polygons
L	Lakes, mainly oriented
AUF	Aufeis (flood icing) occurrences on active flood plains

Depth phases of ice-rich silty topstratum

d	5 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel strata

Buried substratum phases

TC	Tertiary conglomerate, sand and gravel below variable thickness of surficial ice-rich silt

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Sagavanirktok River: Arctic char, grayling, round whitefish, slimy sculpin, burbot, ninespine stickleback, chum salmon.
This river is one of the more important fish streams in this region. The pipeline crosses in the immediate vicinity of an Arctic char overwintering area and is sensitive year round except during breakup. Char were angled throughout the winter in this vicinity.

Small ponds in this region freeze in winter.

Sag River: see comments on w. channel.

Unnamed lake: grayling, ninespine stickleback.
This lake is apparently deep enough to support a permanent population of sticklebacks. A single grayling was also caught here.

BIRDS

Lake, pothole and braided river area. Limited habitat. Waterfowl and shorebirds. Low risk to rare. Breeding, moulting and migration: May to August. Ground disturbance by ATV's will be restricted.

MAMMALS

Winter range for small numbers of caribou, scattered during movement and some calving. Important part of summer range for 3,000 caribou. Concentration on coastal areas during July and Aug.

East of Sagavanirktok River - important habitat for upland furbearers and bears. Important area for year round use and denning by Arctic fox, summer travel and forage area for grizzly bear. Travel route of possible denning area for polar bear.

Important arctic fox denning area within 3 miles of proposed route. Avoid disturbance of den sites.

VEGETATION

[illegible]	Sedge, cottongrass, d. willow, moss, Saxifrag [illegible]	Sedge, d. willow, Polygonum, [illegible]	Scattered to open sedge, d. willow, horsetail on bars	Scattered d. willow - sedge, horsetail	Sedge, d. willow, Salix with mounds of Dryas, Cassiope, Eriophorum, moss	d. willow, sedge, horsetail, scattered to open with some Arctic [illegible]	d. willow, sedge, horsetail, Astragalus	Scattered sand d. willow, sedge	d. willow, sedge, cotton grass, Eriophorum	Sand [illegible]	d. willow, sedge, cotton grass & mounds of Dryas, Cassiope and depressions of wet sedge, moss	Sedge, cottongrass, d. willow, Dryas	d. willow, sedge, moss, cotton grass	

LAND USE

CULTURAL

Archaeology medium priority	Archaeology medium priority	Archaeology medium priority	Archaeology medium priority		Archaeology high priority	

3B-0200-1002

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

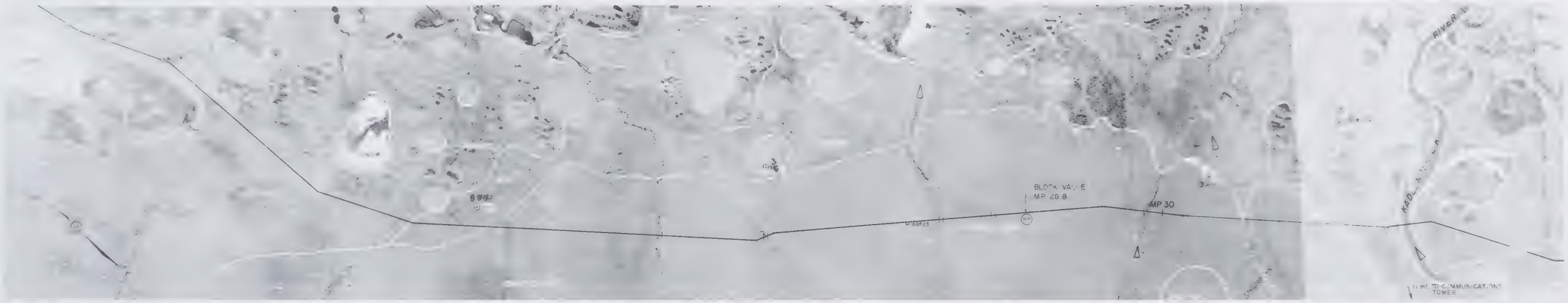
DRILL HOLE DATA

AG 523

PROFILE

SEGMENT NUMBERS

MATCH LINE



CONSTRUCTION DATA

MATCH LINE 33.7

4 0710 059

4 0710 1019

4 0710 1079

4 0710 099

MATCH LINE 33.30

FOOTAGE THIS SHEET

3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

TERRAIN TYPES

Bedrock substratum (water)

TC Tertiary conglomerate, sand and gravel, bedrock underlies the stream (additional units, if any)

U.T.M. GRID ZONE 6

PIPELINE LEGEND

PERMANENT ROAD

HELIPAD

MESSLINE STATION

COMMUNICATIONS TOWER

BM-STAP

STORAGE OR STAGING AREA

CAMP SITE

STAGING AREA & CAMP SITE

BORROW SITE

BRIDGE

PIPE DATA

CONNECTION

MAINLINE

MISCELLANEOUS MATERIAL

DESCRIPTION

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

1 THE TERRAIN ON THIS SHEET WAS MADE FROM AIRPHOTO INTERPRETATION AND CONTRACTORS PROFILES

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG. A 0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

PHOTO NOS

OPERATING LICENCE NO

CONSTRUCTION PERMIT NO

MIN TEST PRESSURE 840 psi

MAX OPERATING PRESSURE 680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. DOWNSTREAM M.P.

3 27

3B 0200-003

ALASKA

3B 1D

TERRAIN MAPPING

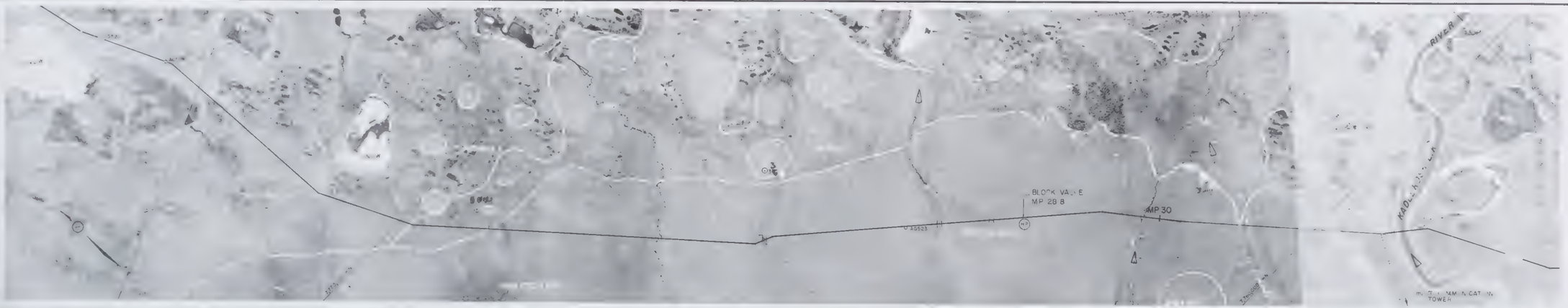
J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

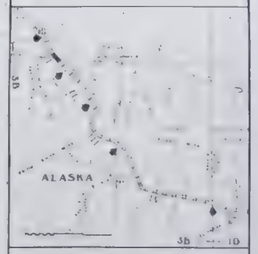
OWNERSHIP

DRILL HOLE DATA

PROFILE

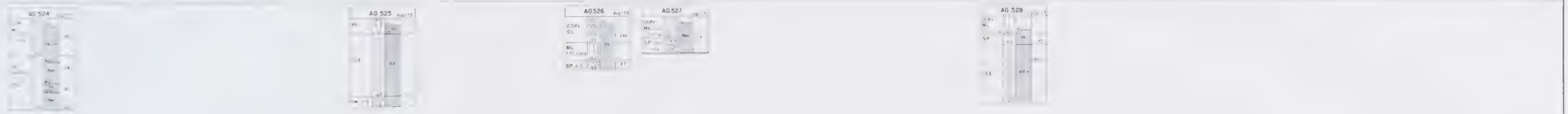


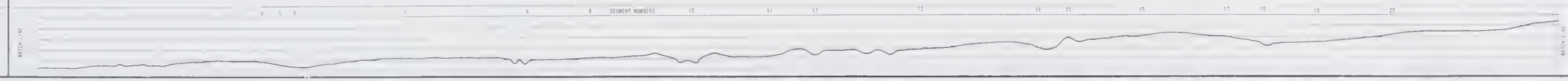
TERRAIN TYPING

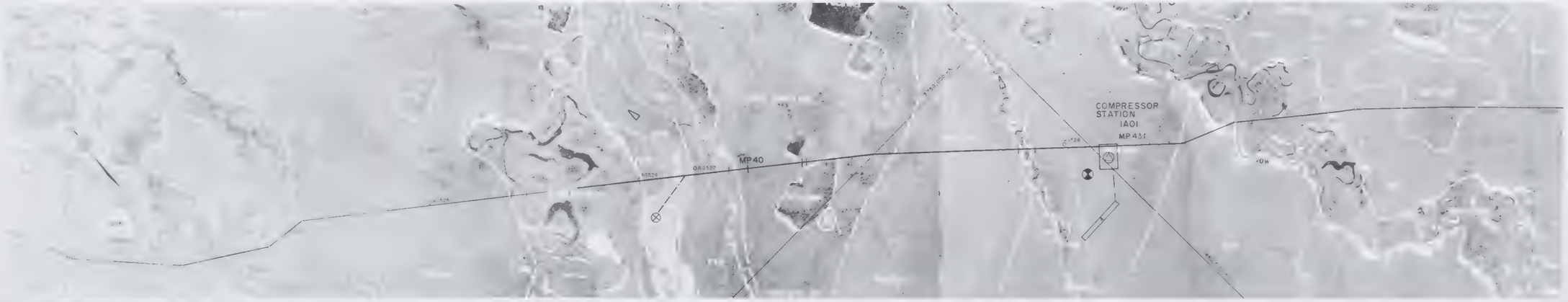


TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3B-0200-1003







CONSTRUCTION DATA

REFERENCE DRAWING Nº(S)

MATCH LINE 33.70 · 4 0210 099 · 4 0210 1099 · 4 0210 1099 · 4 0210 1099

00.00 · 0.55 · 0.85 · 1.62 · 1.84 · 2.04 · 2.15 · 4.14 · 4.20 · 5.31 · 6.13 · 6.75 · 6.81 · 8.73 · 8.87 · 9.17 · 10.23 · 10.72 · 10.78 · 11.59 · 12.22 · 12.93 · 13.1

C

9	10	11	12	13	14	15	16	17	18	19	
1.03	0.82	0.62	0.06	1.92	0.14	0.30	1.06	0.4	0.06	0.78	
EC 1D	N A	EC 1C	N A	EC 1B	N A	EC-1D	EC-1C	EC 1D	N A	EC 1D	
B 1	N A	B 1	N A	B-1	N A	B 0	B-1	B-0	N A	B-1	B 0
I-V-8	I-V-2, V-5	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8			I-V-5	I-V-8	

SCALE (miles)

Sealed drainage ... areas of wide ... ice wedges ...

Lakes, mainly oriented

Depth phases ... ice-rich silty ...

d 5 to 10 ft of ice-rich silts ... over stratified silts to clean sand and gravel strata

TC Tertiary conglomerate, sand and gravel below variable thickness of surficial ice-rich silt

PIPELINE LEGEND

▭	COMPRESSOR STATION
▭	AIR STRIP
○	STORAGE OR STAGING AREA
▲	CAMP SITE
○	STAGING AREA & CAMP SITE
⊗	BORROW SITE
■	WHARF
▬▬	PERMANENT ROAD
▬ ▬	TEMPORARY ROAD
	HELIPAD
▣	MEASURING STATION
●	COMMUNICATIONS TOWER
	SIDE VALVE
········	WINTER TRAIL

PIPE	
CARRIER - 48" O D x 0.800" W T GRADE 70	
HEAVYWALL - 48" O D x 1.034" W T GRADE 65	

COATING DATA

QUAN	DESCRIPTION	REQ'N Nº

BUOYANCY AND EROSION CONTROL LEGEND

B 0	No buoyancy
B-1	Potential buoyant conditions along segment
B 2	Potential buoyant conditions along portions of the segment
N/A	Refer to river crossing drawing
EC 1	Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC 2	Average slope along segment greater than 3° Erodible soil. Close spaced control measures required
EC 3	Average slope along segment less than 3° Non erodible soil. Minimal control measures required
EC-4	Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC 5	Unstable water course. Deeper burial required along segment
EC-6	Control measures required on steep sideslopes
EC 7	Control measures required at steep scarps
EC 8	Ice lying seasonally on slopes. Measures to preserve [illegible]

GENERAL NOTES
1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3 SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4 MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
C712	17 - 27

OPERATING LICENCE Nº	
CONSTRUCTION PERMIT Nº	
MIN TEST PRESSURE	1848 psi
MAX OPERATING PRESSURE	1680 psi

Nº	DATE	REVISION	APP'D BY	APP'D BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 34 DOWNSTREAM M.P. 47

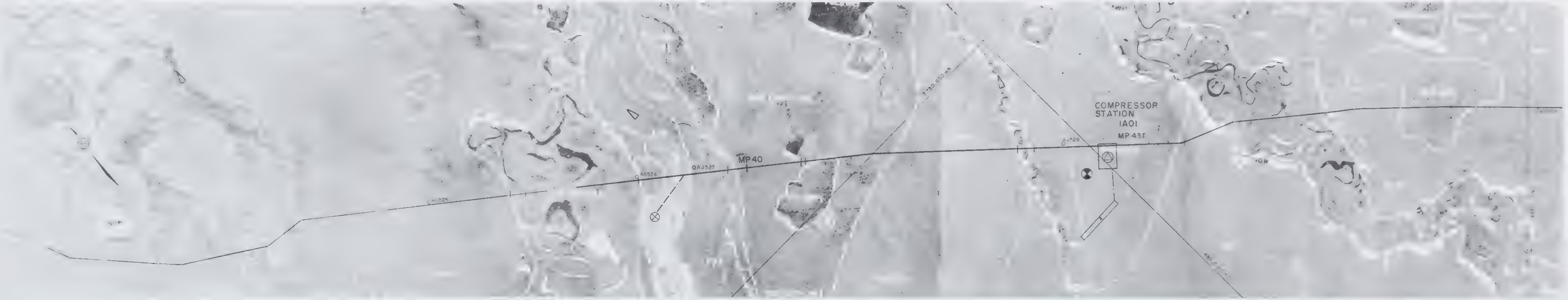
DRN BY	DATE		
CHKD BY NFL	Feb 6/74	SCALE 1" = 2000'	3B 0200-.004
APPD BY		SHEET 4 27	

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA

PROFILE



Shaviovik River: Arctic char, grayling, ninespine stickleback. This river supports a single arctic char spawning and overwintering site approximately 2 miles upstream of the pipeline crossing, which is sensitive at all times. The river is frozen at the pipeline crossing by late winter. Special precautions will be taken during borrow activities to prevent siltation.

These two small streams are [illegible] during the spring and summer months. The streams are sensitive from May 1 to [illegible]. During the winter, however, they are frozen solid.

Winter range for small numbers of caribou, scattered spring movement and some calving. Important part of summer range for 3 000 caribou, concentration on coastal areas during July and August [illegible] Willows east of Shaviovik River provide moose winter range, potential moose summer range. Arctic fox denning area, red fox, wolf, wolverine, ground squirrel and short tailed weasel frequent in this region, grizzly bear in summer, limited [illegible]

Sedge, cottongrass, dwarf willow tussocks with moss. Some frost [illegible] and polygons

Hummocky sedge, dwarf willow. Polygonal wet meadow with [illegible] polygons

Sedge

Dwarf willow, sedge, horsetail, Astragalus

Sedge, cottongrass, dwarf willow

Willow

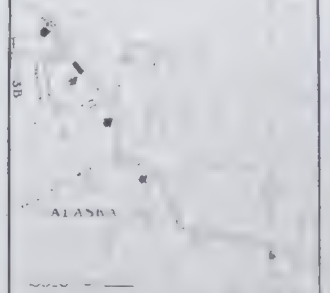
Hummocks of sedge, dwarf willow, Cassiope, lousewort

Sedge, cottongrass [illegible]

Archaeology medium priority

Archaeology high priority

Archaeology medium priority



3B 02[illegible]0-[illegible]4

OWNERSHIP

DRILL HOLE DATA

AG 529

AG 530

AG 531

AG 532

AG 533

PROFILE

SEGMENT NUMBERS

MATCH LINE

MP80

T.74N.,R.10W.

ABSOLOM E

AIRSTRIP

G.R.S.S.

MATCH LINE

ASSEMBLY DRAWING NUMBER

MATCH LINE (1 OF 2)

2 OF 10 1009

MATCH LINE

MATCH LINE

SHEET

0 5

SCALE (miles)

U.T.M. GRID ZONE 5

TERRAIN TYPING LEGEND

poorly drained over 12" boulders and

Scarce, usually shallow thin (1 metre) veneer of over fluvial sand and gravel, substrate

Alpine bedrock (Rocky, usually in outcrop, rock, generally low to moderate excess ice.

Sandy (e.g. sma.. beach ridges, 1.2-2.04 of sediment) alluvial fans

Floods, flood plain: usually thin (one foot) silty to pebbly silt over fluvial sand and gravel, substrate

Outwash: usually sma.. remnants of old or Holocene outwash sand and gravel, low to high excess ice expected.

Silty deposits with subsurface inclusions of some excess ice

Lake and flat

Lakes

ITB Eroding thaw banks

IWP Ice-wedge polygons, well expressed

Lakes

ISP Spaking patterns of small ponds and patterned wet tundra in areas of poorly drained silty soils

Alluvial drainage - smoothly rounded highly ice-rich silt saddle, usually indicates high excess ice

Beaded drainage in areas of active ice-wedge polygons

FOL Former oriented lakes, now partly filled with peat and organic silt

Aufeis (flood icing) occurrences on active flood plains

Lakes

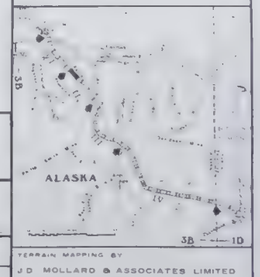
Lakes phases of ice-rich silty topsoil

d 5 to 10 ft of ice-rich silty topsoil over stratified silty to clean sand and gravel

Refined subdivision shows where silt mantle is but areas appears thinner and is discontinuous

Mixed areas of thin to thick 30% over old meadow (FM) and exposed boulders (M in areas of steepest frontal slope

Old outwash (gravelly) deposits beneath thin silt/loess mantle (thin in thick (permafrost) silt and colluvial silt and organic silt



PIPELINE LEGEND

PERMANENT ROAD

TEMPORARY ROAD

MP 80

MP80 SUPER STATION

R.W. STATION

STORAGE OR STAGING AREA

CAMP SITE

STAGING AREA & CAMP SITE

BORROW SITE

WHARF

MISCELLANEOUS MATERIA

GUIDANCE AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. 4-0200-1009 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 2.8 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs	
C117	192	198
	28	30

HEAT NO. LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 1848 psi

MAX OPERATING PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. DOWNSTREAM M.P. 33

DATE 5 · 27

38-0200-1005

TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

AG 509

AG 531

AG 53

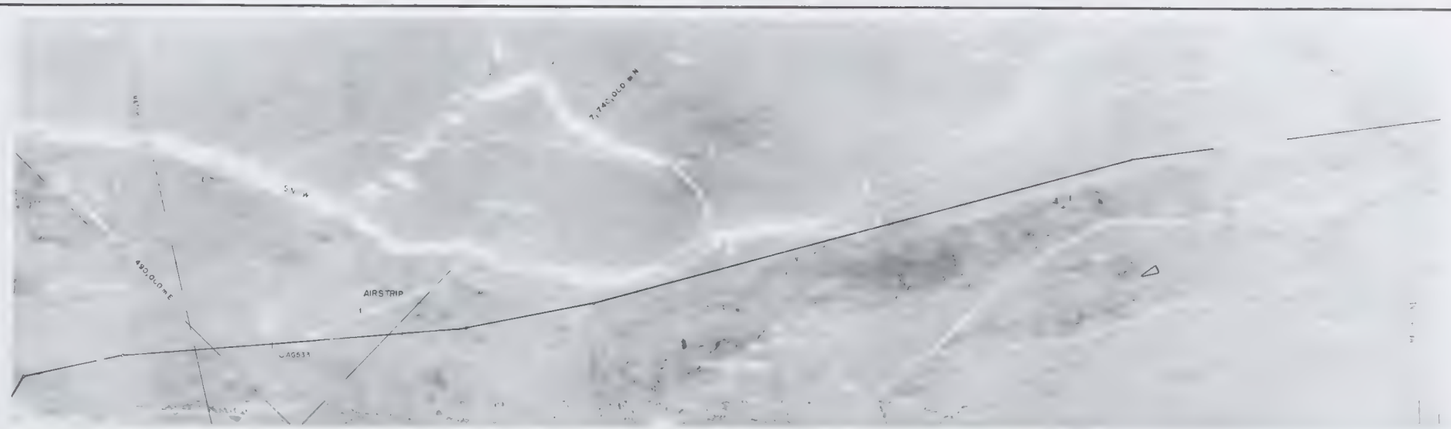
AG 532

AG 533

PROFILE

6 SEGMENT NUMBER

WATER LEVEL



TERRAIN MAPPING EXTENT

Map [illegible]

[illegible]

Discrete Bedrock Mapping [illegible]

[illegible] Bedrock, [illegible] [illegible] sand and gravel, with boulders [illegible]

[illegible] Bedrock exposures [illegible]

[illegible] Bedrock [illegible] [illegible] sand and gravel, [illegible]

Active colluvium, [illegible] Bedrock boulders [illegible]

Extensive low to moderate ice-rich [illegible]

Extensive shallow [illegible] of [illegible]

[illegible] shallow colluvium [illegible] [illegible] sand and gravel, low to high excess ice expected

NOTE: Thin (under) silt mantle [illegible] Bedrock interbedded [illegible] and [illegible] (Egan) silt, deposited with [illegible] [illegible] [illegible]

[illegible]

Legend [illegible]

[illegible] Erosion thaw lakes

[illegible] Ice wedge polygons, well developed.

Permafrost-affected [illegible] features

SP Spotted pattern of small, ponds and [illegible] wet [illegible] areas of poorly drained, [illegible]

SD Horizontal drainage on smoothly rounded rights ice-rich silt mantle, smaller indicated high excess ice

BD Beaded drainage in areas of active ice-wedge

FOL Former oriented lakes, now partly filled with peat and organic silt

ALF Active frost heaving [illegible] on active [illegible] [illegible]

[illegible]

Depth classes of ice-rich silt topstratum

d 5 to 10 ft of ice-rich silty topstratum over [illegible] silty to clean sand and gravel

Buried substratum classes where [illegible] [illegible] [illegible]

[illegible] areas of thin to [illegible] [illegible] [illegible] (M) and exposed boulders (B) in areas [illegible] foothill slopes

[illegible]

[illegible]

TERRA MARKING B.

D. MELLARD & ASSOCIATES LIMITED

ANCHORAGE, ALASKA

3B-1200-005

OWNERSHIP

DRILL HOLE DATA

PROFILE

CONSTRUCTION DATA

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- RELIEF
- WINTER TRAIL
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- WHARF

PIPE DATA

DIAMETER ON	48"	GRADE
WALL THICKNESS	.034"	GRADE X65

COATING DATA

COAT	

MISCELLANEOUS MATERIAL

COAT	DESCRIPTION	BROWN No

BIOTECT AND EROSION CONTROL LEGEND

B.D. No Revegetation

B Revegetation of disturbed areas

B.F. Fertilizer Application and revegetation of area of low vegetation

W.R. Water bar (cross drainage)

EC Drainage and erosion control structure (Rolling Contour, Reverse Slope, etc.)

EC Drainage and erosion control structure (Rolling Contour, Reverse Slope, etc.)

EC.1 Rock and slope erosion control structure (Rip Rap, Gabion, Rock Fill, etc.)

EC.1a Drainage and erosion control structure (Rip Rap, Gabion, Rock Fill, etc.) Rock Fill Drainage Ditch

EC.2 Drainage and erosion control structure (Rock Fill, etc.)

Rock Fill Drainage Ditch (Reverse Slope) Rock Fill Drainage Ditch (Rolling Contour)

EC.2 Drainage and erosion control structure (Rock Fill, etc.)

EC Control measures required at stump excess

EC.1a Log lying perpendicular slope. Measures to preserve micro drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA. [illegible]

[illegible]

[illegible]

* MINIMUM DEPTH OF COVER - 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
C 711	199 - 205
M - 80	14582

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 848 psi

MAX OPERATING PRESSURE 1680 psi

Nº	DATE	REVISION	APPRO. BY	APPRO. BY

NORTHERN Engineering Services Company Limited

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 59 — DOWNSTREAM M.P. [illegible]

APPRO. BY [illegible] DATE [illegible]

SCALE 1" = 1000'

SHEET 6 OF 27

38-0200-1006

TERRAIN TYPING LEGEND

[illegible]

generally low to moderate excess ice

[illegible] sediments consisting of [illegible] sand and gravel

Fluvial flood plain, mainly thin topsoil over silty to [illegible]

[illegible] marine shell remnants of old [illegible] and sand and gravel, low to high excess ice expected

RSR Smoothly rounded silt-mantled sloping regions mainly interbedded colluv (silt) and colluvial [illegible] of none-excess ice

PHASES AND FEATURES

2 graphic phases

[illegible] Eroding thaw banks

[illegible] Ice wedge polygons, well expressed

[illegible] 1 graphic phases

LP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soils

ID Horizontal drainage on smoothly rounded highly ice-rich silt mantle, usually indicates high excess ice

[illegible] Beaded drainage in areas of active ice-wedge polygons

FDL Former oriented lakes, now partly filled with peat and organic silt

AOF Aufeis (flood icing) occurrences on active flood [illegible]

Lakes

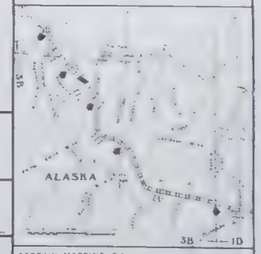
Depth phases of ice-rich silty substratum

D 5 to 10 ft of ice-rich silty substratum over stratified silty to clear sand and gravel

Buried substratum phases where silt-mantle in RSR areas appears thinner and or discontinuous

[illegible] Mixed areas of thin to thick GSI over old moraine (OM) and exposed boulders (R in areas of steeper foothill slopes

OM Old "till" (gravelly deposits formed) discontinuous mantle of thin to thick loess, colluv and colluvial silt and organic silt



TERRAIN MAPPING BY

J D MOLLARD & ASSOCIATES LIMITED

REGINA, SASK

DRILL HOLE DATA

PROFILE

[illegible] Tributary [illegible] and [illegible] [illegible] the other

Kavik River [illegible] gravel [illegible]
This is a summer feeding area for char and grayling [illegible] spring
[illegible] to the Kavik at the [illegible] left
[illegible] not used by char as a spawning [illegible] over
[illegible]

Borrow source
Special precautions will be taken during borrow activities to prevent siltation

Tributary – intermittent summer flow and no flow in winter

Minor drainages – intermittent flow

Summer range for small bands of caribou [illegible] movements of several hundreds to several thousand in southward direction

Fossil flood plain (FFP) terrain – year round use by [illegible] and furbearers, grizzly bear and moose; concentration zone for furbearers and grizzly bear, denning by wolves. Arctic fox, red fox and ground squirrels; caribou common during summer and frequently numerous – important habitat

[illegible] tussocks	Sedge [illegible] cottongrass [illegible]	Sedge [illegible] cottongrass moss	Sedge [illegible] moss some inclusions of wet sedge [illegible]	Dryas	[illegible] sedge cotton with some tussocks	Dryas	[illegible] sedge cottongrass	Sedge [illegible] cottongrass [illegible] some tussocks	S[illegible] Dryas [illegible] grass [illegible]

TERRAIN TYPING LEGEND

ARCTIC NORTH SLOPE [illegible] VIA [illegible] RIVER

Shaviovik River to Canning River [illegible]

TERRAIN TYPES

AFD Alluvial fan deposits: mainly poorly sorted ice-rich silty sand and gravel with boulders and organic layers

AFP Active flood plain: mainly exposed riverbed sand and gravel [illegible]

[illegible] Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel substrate

[illegible] Alpine moraine complex: mainly bouldery till, generally low to moderate excess ice

[illegible] Bedrock: small bedrock outcrops of sedimentary rocks

[illegible] Fossil flood plain: mainly thin ice-rich silty topstratum over silty to clean sand and gravel

[illegible] Outwash: mainly small remnants of old much-modified outwash sand and gravel, low to high excess ice expected

[illegible] Smoothly rounded silt-mantled sloping regions: mainly interbedded eolian (silt) and colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases

ETB Eroding thaw banks

IWP Ice-wedge polygons well expressed

Vegetation, site [illegible] topographic phases

[illegible] Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soils

[illegible] Horsetail drainage on smoothly rounded highly ice-rich silt mantle, usually indicates high excess ice

[illegible] Beaded drainage in areas of active ice-wedge polygons

FOL Former oriented lakes, now partly filled with peat and organic silt

AUF Aufeis (flood icing) occurrences on active flood plains

L Lakes

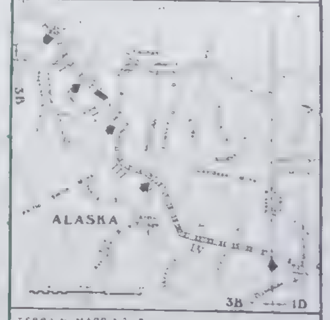
Depth phases of ice-rich silty topstratum

d 3 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel

Buried substratum phases where silt-mantle in RSR areas appears thinner and or discontinuous

RSR (M) Mixed areas of thin to thick RSR over old moraine (OM) and exposed bouldery TM in areas of steeper foothill slopes

[illegible] Old outwash (gravelly) deposits beneath discontinuous mantle of thin to thick ice-rich eolian and colluvial silt and organic silt



TERRAIN MAPPING B
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

3B-J200-1006

OWNERSHIP

DRILL HOLE DATA

PROFILE

FOOTAGE THIS SHEET

PIPELINE LEGEND

- PERMANENT ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- METERING STATION
- AIR STRIP
- STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- OTHER

PIPE DATA

SMYS	48,000 x 0.800" WT GRADE 70
HEAVIWALL	48,000 x 1.034" WT GRADE 65

COATING DATA

MAINLINE MATERIAL

QUAN	DESCRIPTION	REQN No

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy

B 1 Potential buoyant conditions along segment

B 2 [illegible]

B 3 [illegible]

B 4 [illegible]

EC [illegible]

EC [illegible]

EC [illegible]

EC [illegible]

EC [illegible]

EC [illegible]

EC [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

2. SEGMENT MILEPOST (DUALS) MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3. SEE DWG # 0800-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4. MINIMUM DEPTH OF COVER = 2.0 FEET

AERIAL PHOTOGRAPHY

ROLL No	PHOTO Nos
N - 70	14581
N - 50	14589
W - 15	7235

PERMITTING LICENCE No

CONSTRUCTION PERMIT No

MIN. TEST PRESSURE 848.0 psi

MAX. OPERATING PRESSURE 680.0 psi

No.	DATE	REVISION	APPD.	APPD.

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

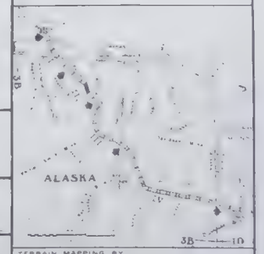
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

SHEET 7 OF 27

3B-0200-1007



TERRAIN MAPPING BY

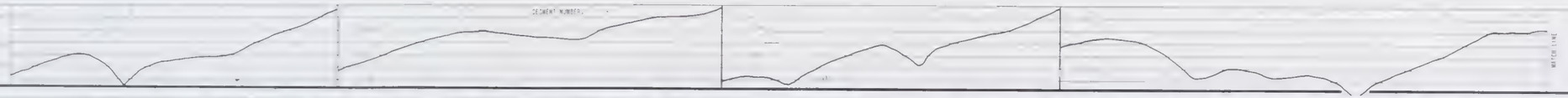
J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



TERRAIN TYPING LEGEND

II -- ARCTIC NORTH SLOPE FOOTHILLS, PORCUPINE PLATEAU (ITIA LANDING AREA)

Shaviovik River to Canning River Lake

LEGEND TYPE

A Alluvial fan deposits: mainly poorly sorted ice-rich silty sand and gravel with boulders and cobbles, cobbles

A Flood plain: mainly exposed riverbed sand and gravel, scrape

A Flood plain: mainly thin ice-rich silty topstratum over silt/sand, sand and gravel substrata

A Alpine moraine deposits: mainly boulders till, generally low to moderate excess ice

B Bedrock: small bedrock outcrops of sedimentary rocks

C Fossil flood plain: mainly thin ice-rich silty topstratum over silt to clean sand and gravel substrata

D Outwash: mainly small, remnants of old much modified outwash sand and gravel, low to high excess ice expected

E Smooth, rounded silt-mantled sloping regions mainly interbedded eolian (silt) and colluvial, organic silt, deposits with numerous inclusions of thick excess ice

FEATURES AND FEATURES

Topographic phases

ETB Eroding thaw banks

IVP Icewedge polygons, well expressed

Permafrost-affected bodies

Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soils

Notestall drainage on smooth, rounded highly ice-rich silt mantle, usually indicates high excess ice

Beaded drainage in areas of active icewedge polygons

Former oriented lakes, now partly filled with peat and organic silt

Aufeis (flood icing), occurrences on active flood plains

Lakes

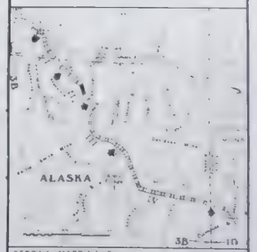
Areas of ice-rich silt

5 to 10 ft of ice-rich silty topstratum over stratified silty to clean sand and gravel

Buried substratum phases where silt-mantle in RSB areas appears thinner and/or discontinuous

RSB(OM) Mixed areas of thin to thick RSB over old moraine (OM) and exposed boulders (M) in areas of steeper foothill slopes

Old outwash (gravelly) deposits beneath discontinuous mantle of thin to thick ice-rich eolian and colluvial silt and organic silt



TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

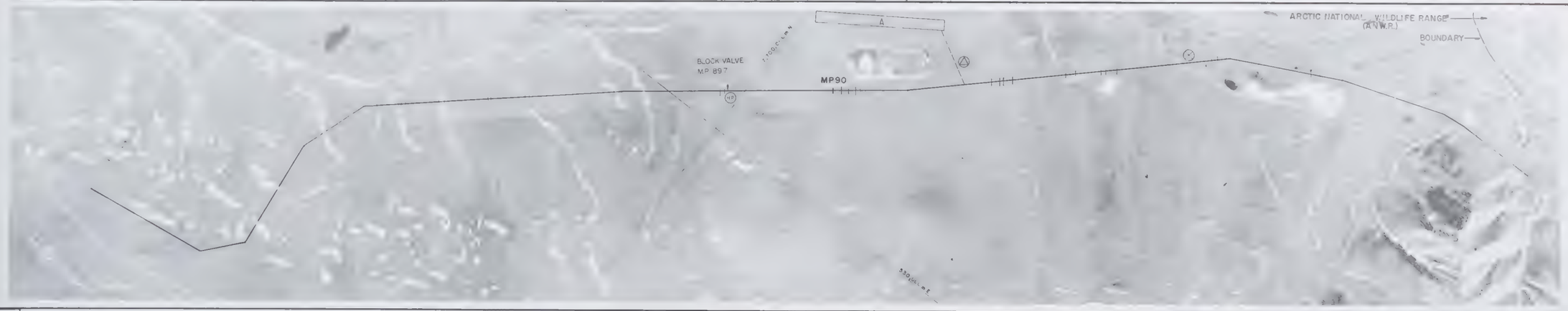
REGINA, SASK

3B-0200-1007

DRILL HOLE DATA

PROFILE

SEGMENT NUMBERS 9 20 21 22



MATCH LINE 89.10

FOOTAGE

MATCH LINE 90.10

REVEG

PIPELINE LEGEND

COMPRESSOR STATION
STORAGE OR STAGING AREA
STAGING AREA & CAMP SITE
WHARF
PERMANENT ROAD
TEMPORARY ROAD
COMMUN CATIONS TOWER

PIPE DATA

CARRIER - 48" O.D. x 0.800" WT GRADE X-65
HEAVYWALL 48" O.D. x 0.934" WT GRADE X-65

MISCELLANEOUS MATERIAL

DUSTANCE AND EROSION CONTROL LEGEND

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3 TEL DWG. A-0200-1001
FOR NOMENCLATURE USED IN SOIL DESCRIPTION ON DRILL HOLE LOGS
4 MINIMUM DEPTH OF COVER = 2.5 FEET

CONSTRUCTION PERMIT NO.
MIN. TEST PRESSURE 1848 psi
MAX. OPERATING PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

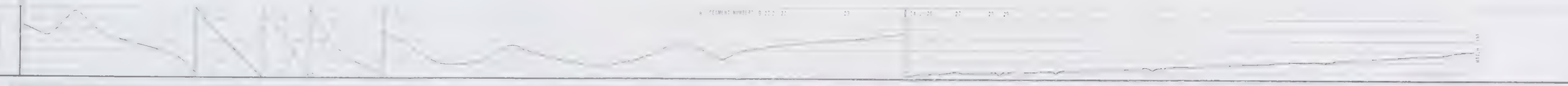
UPSTREAM M.P. DOWNSTREAM M.P.

SCALE 1" = 1000'
SHEET 8 OF 27
3B-0200-1008

ALASKA
3B 1D

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

DRILL HOLE DATA



Minor drainages - no winter flow

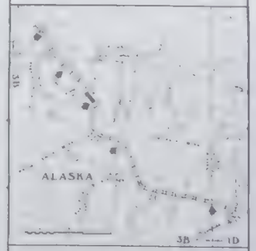
Unnamed lake just off top of cap - contains grayling.

Unnamed spring - A 15' 0 char
Spring - Tec Channel - upstream from pipe - the route sens five year round
Spring is - mab ted by an iso ated pool at pis of dwarf birch char

A few 100 to a few 1 000 caribou winter west of Tetlin on ridges between Canning and Kavik Rivers - and a few occasionally enter this territory - several 100 - several 1 000 cross on migration down Canning River - under - year round moose range
Low to moderate value habitat for upland furbearers and hears

40 Da - sheep - and th s mountain - h fate winter range and Kavik summer of 1972

Sedge - d w low cottongrass - d h birch	300'	Sedge - d w - ow	100'	Sedge - d w - low - 3 - birch - moss	300'	Sedge - d w - low - moss Dryas w - some tussock formation	100'				

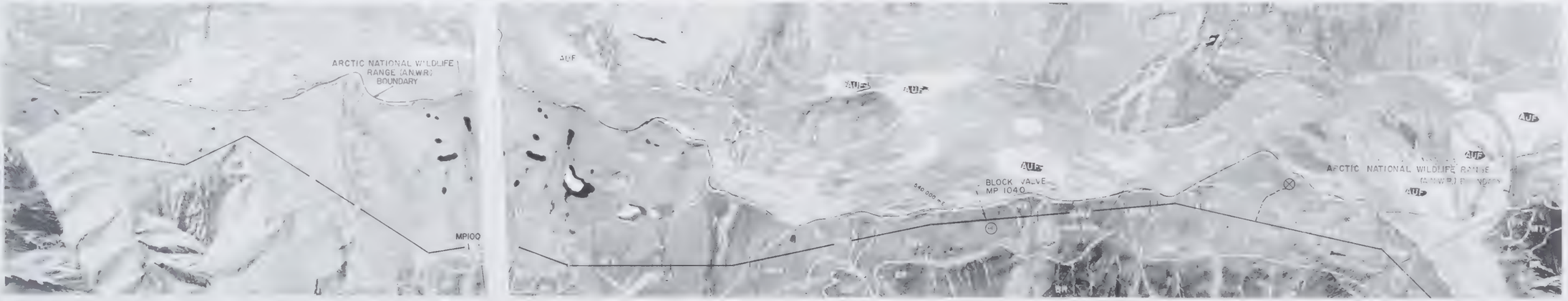


18-0200-1008

DRILL HOLE DATA

PROFILE

SEGMENT NUMBER



MATCH LINE

MATCH LINE

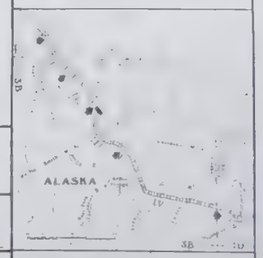
FOOTS OF THIS SHEET

	0.33	0.13	0.0	0.63	0.23	1.07	0.4	1.18	0.3	0.05	0.72	0.2				
	EC 5	N A	EC 5	EC 1C	EC 5	N A	EC 5	EC 2C EC-6	EC 5	N A	EC-2C	EC 5	N A			
	0 0	N A	0.0	0 0	0 2	N A	0 0	0 0	0 0	N A	0 0	0 0	N A			
		1 Y 5	1 Y 6	1-Y-6		0 Y 5		1-Y-6		1 Y-5	1-Y-6					

U T M GRID ZONE

0 5
SCALE (miles)

NOTE IWP See Photo Dv



PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- PILLPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE

CARRIER - 48" OD x 0.800" WT GRADE 70
HEAVYWALL - 48" OD x 1.034" WT GRADE 65

COATING DATA

MATERIALS MATERIAL

BIODEGRADE AND EROSION CONTROL LEGEND

B 0 Not applicable
B 1 Potential hazard conditions along segment
B 2 Potential hazard conditions along segment (No segment)
N A Water in river crossing drawing
EC 1 Average slope along segment less than 3° Erodible soil Control measures required in rpa areas only
EC 2 Average slope along segment greater than 3° Erodible soil Close access control measures required
EC 3 Average slope along segment less than 2° Non erodible soil Minimal control measures required
EC 4 Average slope along segment greater than 3° Non erodible soil Control measures required in rpa areas only
EC 5 Erodible water courses Ditch Gullies required along segment
1 Y 1 Control measures required at stop points
1 Y 5 See long sensitive areas Measures to preserve micro drainage

THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON [illegible] CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG 4-0200-K001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER - 0.8 FEET

ROLL NO	PHOTO NOS
CT12	62
CT12	68 73

PERMIT NO (HEN ENE)
CONSTRUCTION PERMIT NO

MAX OPERATING PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

UPSTREAM M.P. 18 DOWNSTREAM M.P. 22

DRN BY DATE
CHK BY DATE
APPD BY DATE

SCALE 1" = 2000'
SHEET 9 OF 27

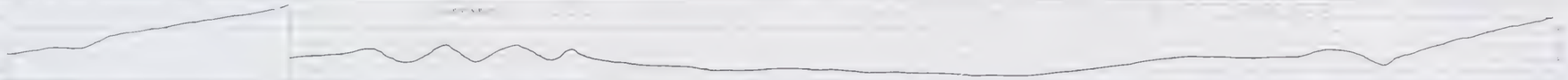
3B-0200-1009

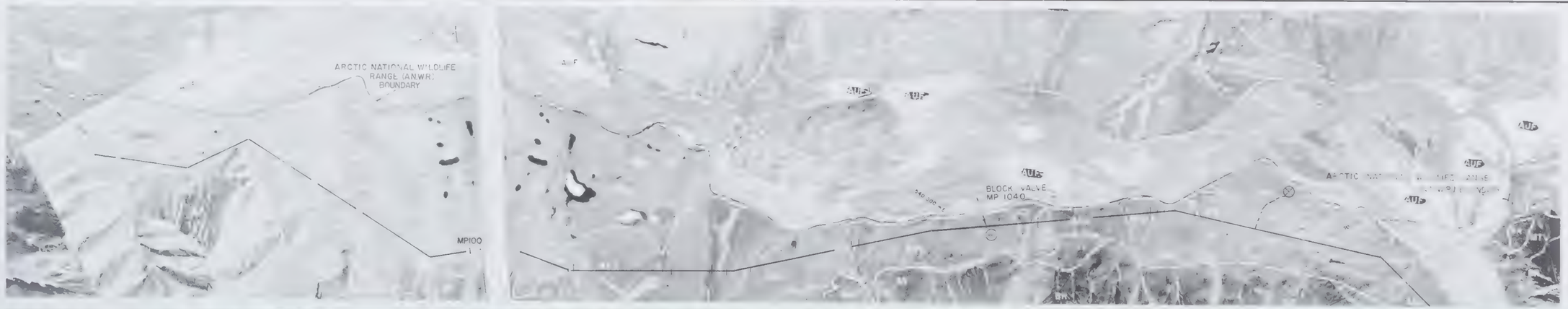
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED

OWNERSHIP

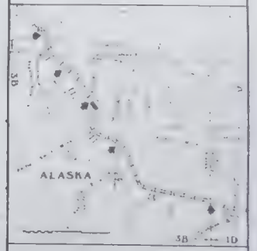
DRILL HOLE DATA

PROFILE





NOTE: 1MP=See Physio Div. IX



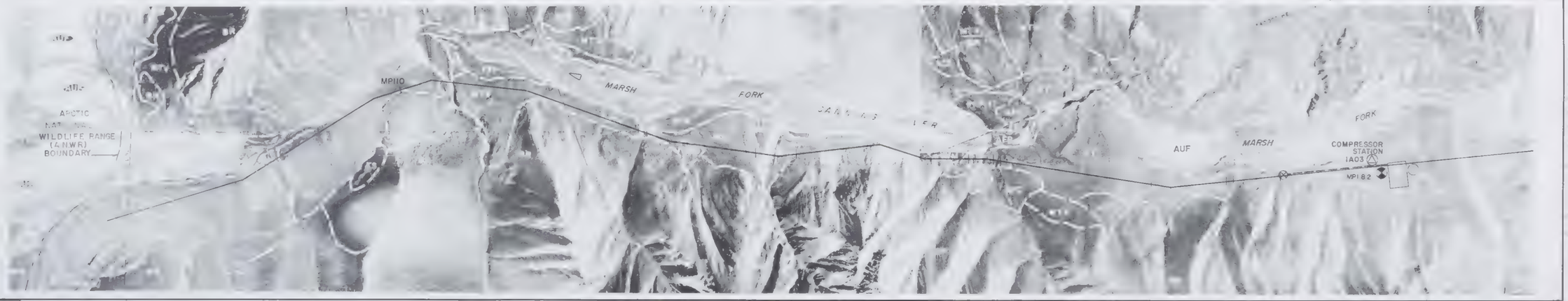
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3B-0200-1009

OWNERSHIP

DRILL HOLE DATA

PROFILE



11	12	13	14	15
1 10	0 32	0 06	0 14	0 06
EC 7B EC 8	EC-5	N A	EC 10	N A
8-0	8-0	N A	8-0	N A

SCALE IN MILES

PIPELINE LEGEND

- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- WHARF
- PERMANENT ROAD
- WINTER ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- BYPASS VALVE
- WINTER TRAIL

PIPE DATA	QUAN
CARRIER - 48"OD x 0.800" WT GRADE 70	
HEAVYWALL 48"OD x 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REGN NO

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 [illegible] along segment
H.A. Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Particular care required along segment
EC-2 [illegible] along segment [illegible]
EC-3 [illegible]
EC-4 Side slope along segment less than 3° Non erodible soil. Normal control measures required
EC-5 [illegible] along segment
EC-6 [illegible]
EC-7 [illegible] along segment
EC-7B [illegible]
EC-8 Control measures required at steep slopes
EC-9 [illegible] along segment
EC-10 [illegible]
EC-11 [illegible]

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.

3 SEE DWG 4-0200-1000. FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 3.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nº
C712	112 122

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

Nº	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 38 DOWNSTREAM M.P.

SCALE 1:10 2

38-0200-1010

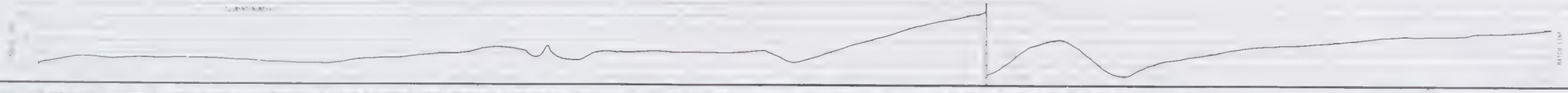
TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA SASK.

DRILL HOLE DATA

PROFILE



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3B-0200-1010

OWNERSHIP

DRILL HOLE DATA

PROFILE

SEGMENT NUMBERS

INSTRUCTION DATA

MATCH LINE 19+15

	1	2	3	4	5	6	7	8	9																			
	0.57	0.12	0.20	0.10	0.33	0.27	0.15		3.50																			
			EC-5	EC-2C EC-6	EC-6	EC-5	N.A.		EC-2C EC-6	0.28	1.10	0.29	0.53	0.44	0.27	0.24	0.33	1.11									
										N.A.	EC-2C, EC-6	EC-5	EC-2C	EC-5	N.A.	EC-5	EC-4C EC-6	EC-2C EC-6									
										N.A.	B-0	B-0	B-0	B-0	N.A.	B-0	B-0	B-0									

NORTHING

EASTING

SCALE: FEET

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- QUARRY

PIPE DATA

	QUAN
[illegible] WT GRADE [illegible]	
HEAVYWALL - 48" OD x 0.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN NO

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy

B-1 Particular buoyant conditions along segment

B-2 Relatively buoyant and [illegible] along [illegible] of the segment

N/A Data in first pressing drawing

EC-1 Average slope along segment less than 3° Erodible soil Control measures required in low areas only

EC-2 Average slope along segment greater than 3° Erodible soil Slope spread control measures required

EC-3 Average slope along segment less than 3° Non-erodible soil Minimal control measures required

EC-4 Average slope along segment greater than 3° Non-erodible soil [illegible]

EC-5 [illegible] Drops to [illegible] of the segment

EC-6 Control measures required on steep sideslopes

EC-7 Control measures required on steep slopes

EC-8 [illegible] Drops to [illegible] of the segment

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

"MOMENT" MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL NO	PHOTO NOS

OPERATING LICENCE NO	
CONSTRUCTION PERMIT NO	
MIN TEST PRESSURE	1848 psi
MAX OPERATING PRESSURE	1680 psi

NO	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

DRAWN [illegible]

CHECKED [illegible]

APPROVED BY [illegible] FEB 8/78

SCALE 1" = 2000'

SHEET 11 OF 27

3B-0200-1011

TERRAIN MAPPING BY

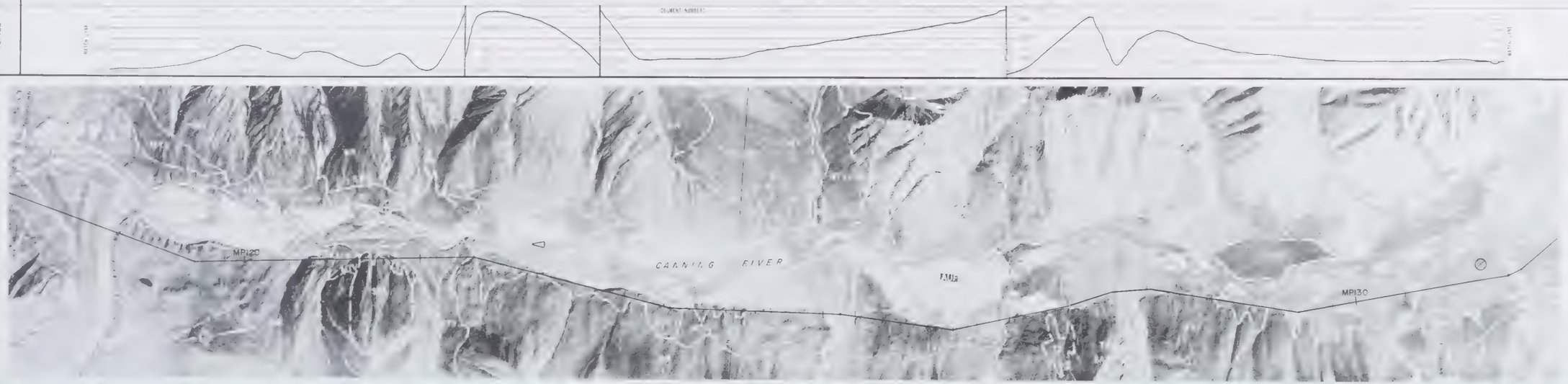
J D MOLLARD & ASSOCIATES LIMITED

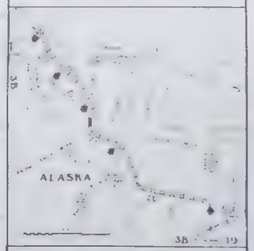
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA

PROFILE





TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3B-0200-1011

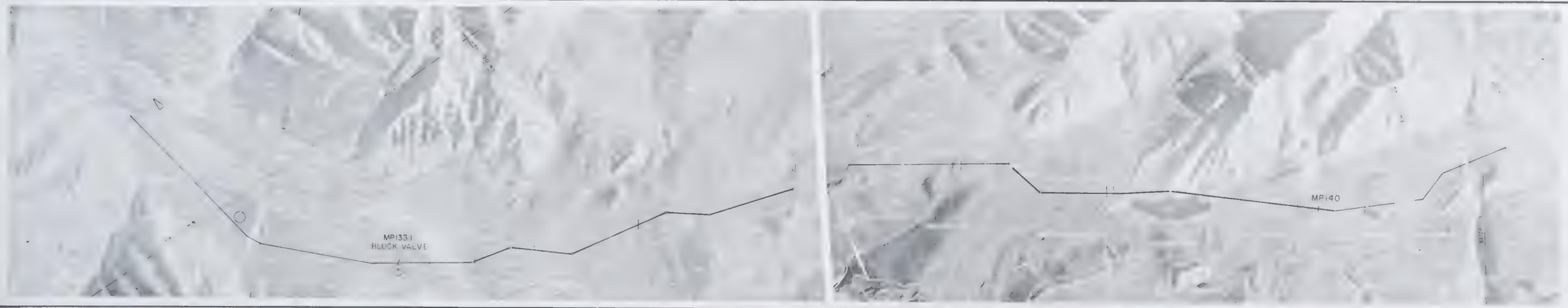
OWNERSHIP

DRILL HOLE DATA

PROFILE

"CUMBAT NUMBER"

MATCH LINE



REFERENCE DRAWING & NOTES

MATCH LINE 13.10

4 0110 .059

MATCH LINE

4 0110 .096

4 0110 .099

4 0110 .109

MATCH LINE 141.10

FOOTAGE THIS SHEET

EC 2 EC 3 EC 4

U T M GRID ZONE 6

NORTH

SCALE 1" = 1000'

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HEL PAD
- MEASURING STATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- SIDE VALVE
- WINTER TRAIL

PIPE DATA

ARMCO API [illegible] GRADE X-65

HEAVYWALL - 48 OD x .034" WT GRADE 65

COATING DATA

MISC. ANCILLARY MATERIAL

QUAN	DESCRIPTION	REQN Nº

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy

B-1 Potential buoyant conditions along segment

B-2 Potential buoyant conditions along portions of the segment

W/S Water to river crossing drawing

EC Average slope along segment [illegible] Control measures required in low areas only

EC-2 Average slope along segment greater than 2° Erodible soil Close spaced control measures required

EC-3 Average slope along segment less than 2° Non erodible soil Minimal control measures required

EC-4 Average slope along segment greater than 2° Non erodible soil Control measures required in low areas only

EC-5 Erodible water course Deeper burial required along segment

EC-6 [illegible] measures required [illegible] Few cases

EC-7 [illegible] measures required [illegible]

EC-8 [illegible] Deeper burial required [illegible] drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 0.9 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
NW 7887	58 - 65
NW 7887	66 - 71

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE 948 PSI

MAX. OPERATING PRESSURE 1680 PSI

Nº	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 132 DOWNSTREAM M.P. 142

APPD BY

SHEET 12 OF 27

3B-0200-1012

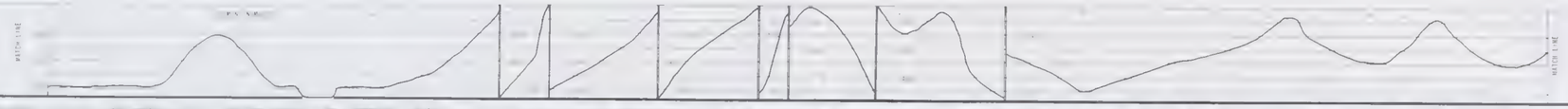
TERRAIN MAPPING BY

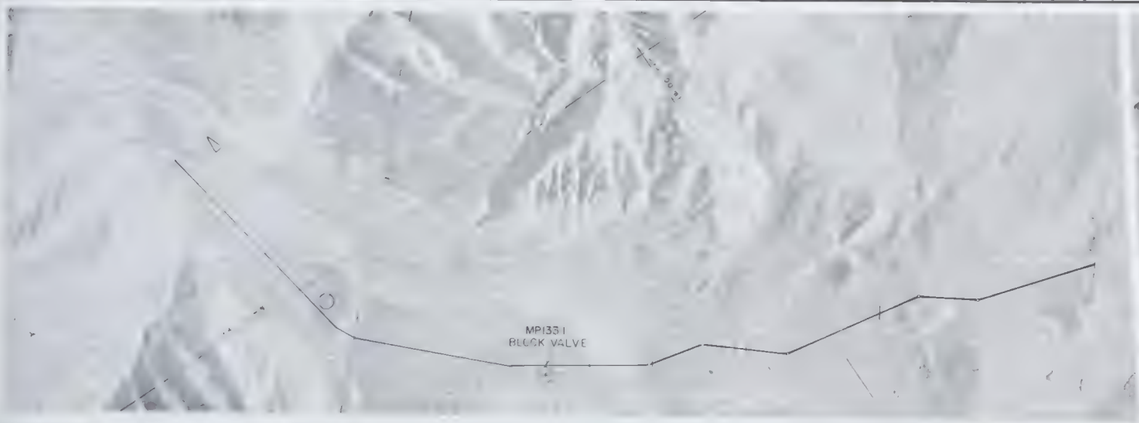
J.D. MOLLARD & ASSOCIATES LIMITED

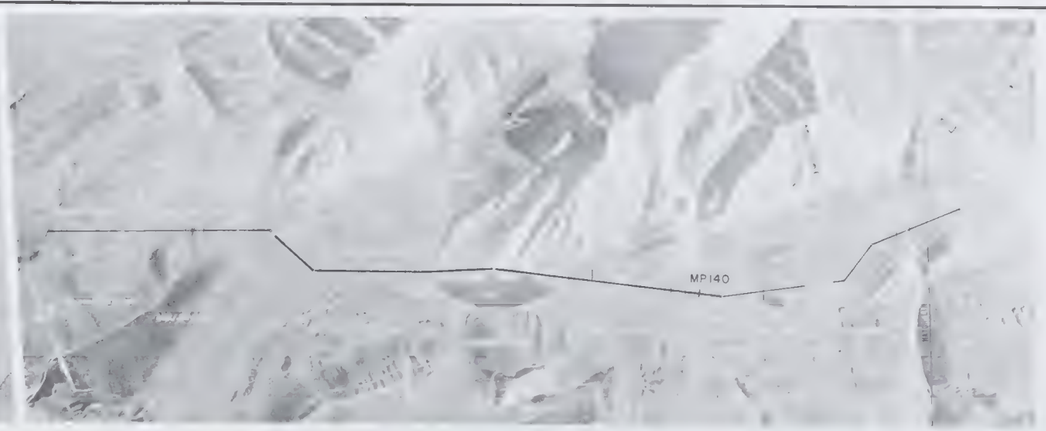
REGINA, SASK

DRILL HOLE DATA

PROFILE







TERRAIN TYPING LEGEND

Surficial features

Alluvial fans

Alluvial terraces, generally gravelly sands, gravels, of alluvial sand, gravel, (a.s.) Notes: [illegible]

Lake and wetlands, alluvial [illegible] silts, fine sands, organic muck, and snow melting muck (l)

Talus & cones, lateral moraines, granitic cones and of talus [illegible] of steep slopes. Fine silt, sand, gravel, cobbles, boulders (ts, [illegible])

Surficial features

Old slide features. Largely broken slide rock on steep bedrock slopes

Active flood & ingl occurrences on the active [illegible]

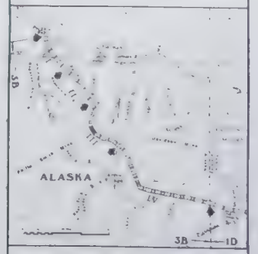
Rock glaciers [illegible] fine fragments with silt and [illegible] (r.g.) Subject to bulkhead creep, [illegible]

Ice wedge polygons damaged, [illegible] subsurface

Surficial features

[illegible] fine silt, fine sand, gravel, and [illegible]

Some examples of combinations of two terrain types that are either too small individually to be [illegible] mapped separately at the scale of the [illegible] [illegible] site. [illegible] variable depths of fine materials over an uneven bedrock surface. [illegible] variable depths of talus materials over alpine meadow



TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3B-0200-1012

OWNERSHIP

DRILL HOLE DATA

PROFILE

CONSTRUCTION DATA

FOOTAGE THIS SHEET

PIPELINE LEGEND

- COMPRESSOR STATION
- A.M. STAT.
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- MAINLINE SITE
- MARKER
- HORIZONTAL ROAD
- MILEPOST
- MEASURING STATION
- NEW MAINLINE OTHER
- WINTER TRAIL

SUBSURFACE AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE M LEPOST PLUS CHAINAGE VALUE
3. SEE DWG # 0200-100 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nº
NW 79872-9	40 54
NW 79872-7	34 39

PERMIT NO. LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE 948 psi

MAX. OPERATING PRESSURE 680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. DOWNSTREAM M.P.

DRN BY DATE

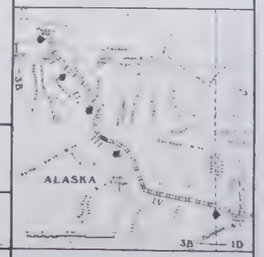
CHKD BY Feb 7/74

APPRD BY Feb 8/74

SCALE 1" = 2000'

SHEET 13 OF 27

3B-0200-1013



TERRAIN MAPPING BY

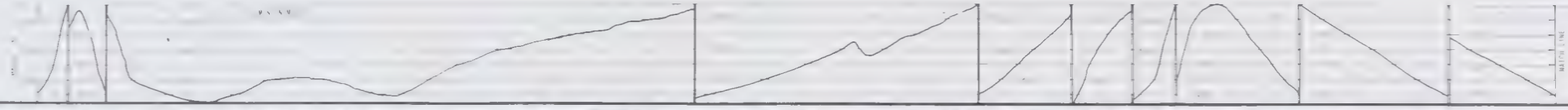
J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

3B-0200-1013

OWNERSHIP

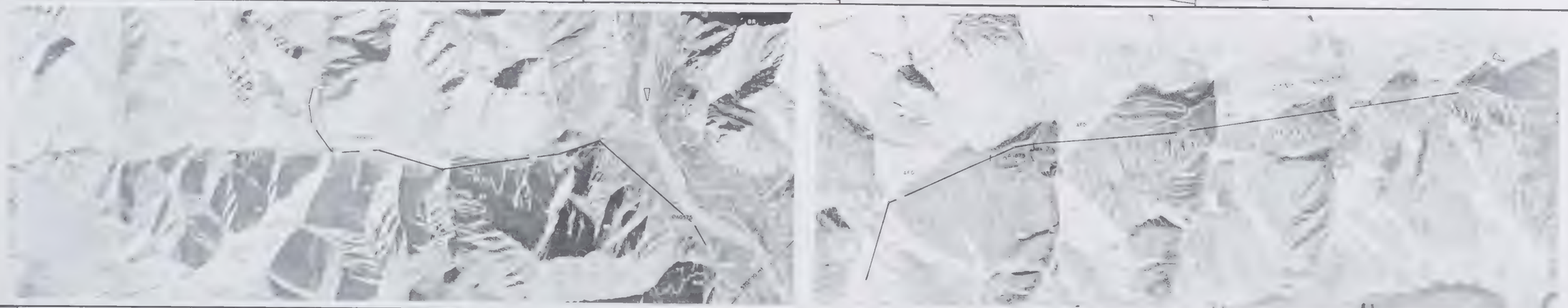
DRILL HOLE DATA

AG 574

AG 575

AG 576

PROFILE



REFERENCE DRAWING

CONSTRUCTION DATA

MATCH LINE

MATCH LINE

MATCH LINE

MATCH LINE

FOOTAGE THIS SHEET

0.5 1.0

SCALE (miles)

U.T.M. GRID ZONE 6

PIPELINE LEGEND

- PERMANENT ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- AMMUNITION
- COMPRESSOR STATION
- AIR STRIP
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF

PIPE DATA	QUAN
CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.036" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQN NO

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- W-0 Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil. Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible
- EC-4 [illegible]
- EC-5 Erodible water course. Ranger Patrol required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 [illegible]
- EC-8 [illegible] to preserve micro drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA. AS INDICATED, IT IS THE CONTRACTORS RESPONSIBILITY TO ASSUME HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOSTS EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALVE
3. SEE DWG 4-0000-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL NO	PHOTO NOS
NW01910	60-67
NW19872	44 45

OPERATING LICENCE NO	
CONSTRUCTION PERMIT NO	
MIN TEST PRESSURE	1080 psig
MAX OPERATING PRESSURE	1680 psig

NO	DATE	REVISION	APPD	APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 151 — DOWNSTREAM M.P. 152

DRAWN		
CHK'D		
APPRD BY		
SCALE 1:2000		
SHEET 14 OF 27	3B-0200-1014	

TERRAIN MAPPING BY
J.D. MOULLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

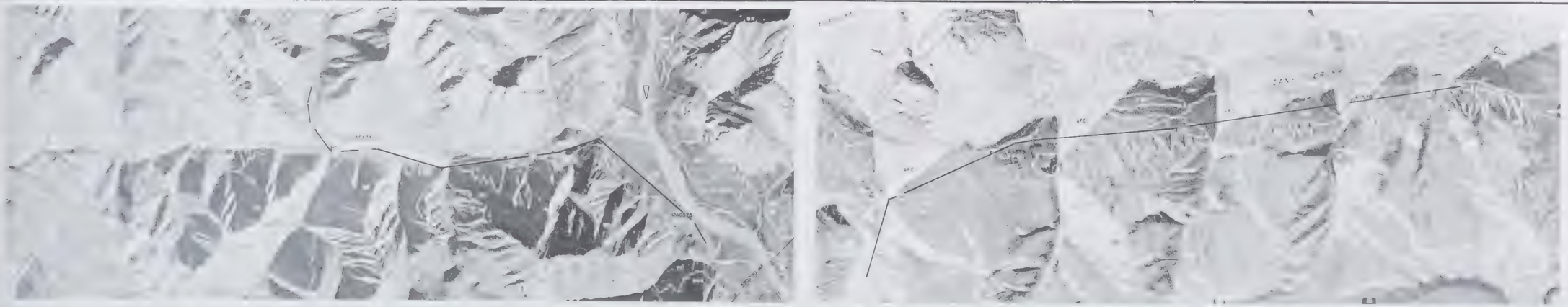
DRILL HOLE DATA

AG574

AG575

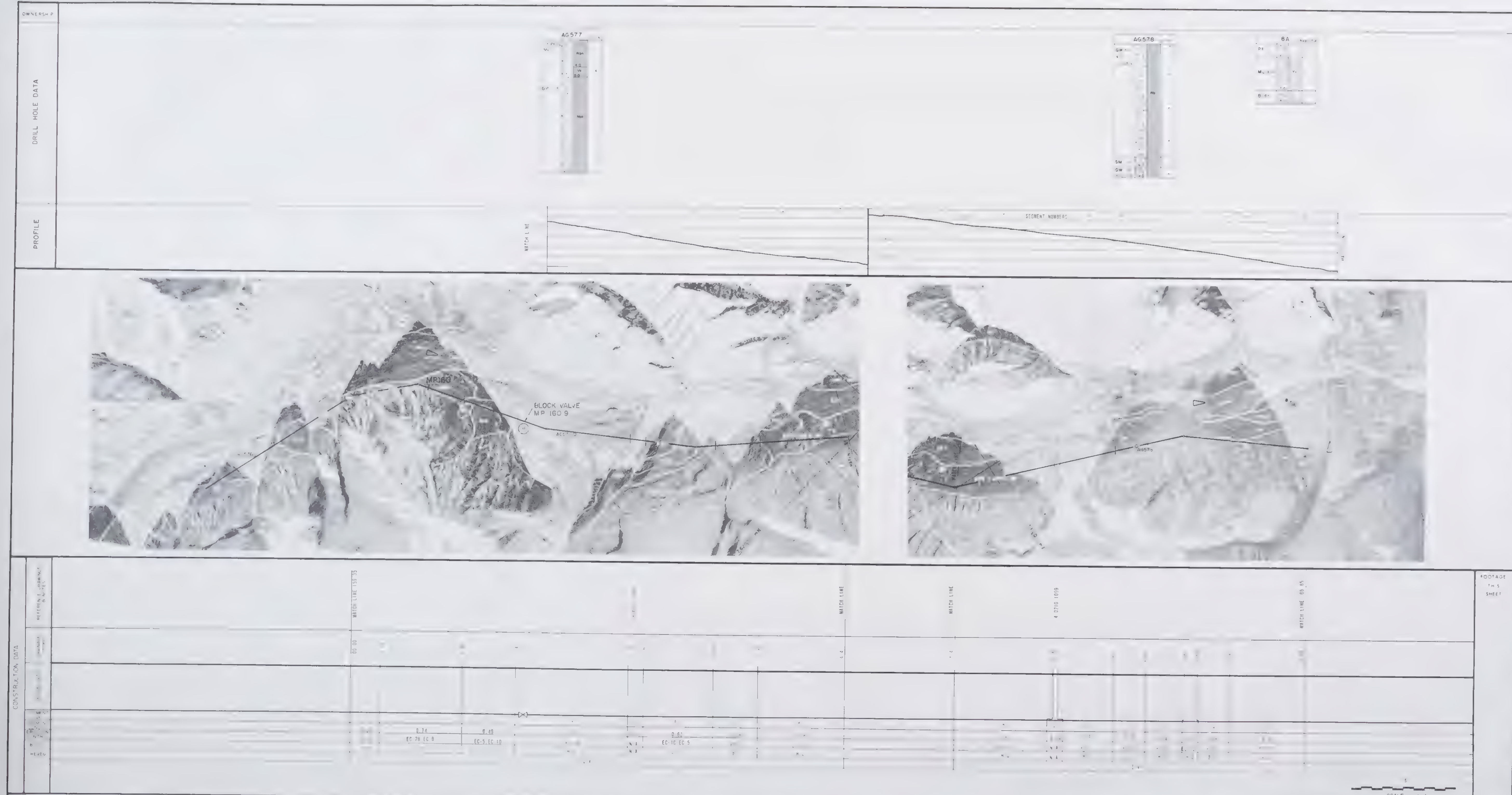
AG576

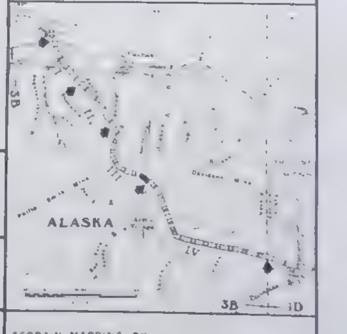
PROFILE



TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

38-0200-10-4





PIPELINE LEGEND

COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
WHARF
PERMANENT ROAD
TEMPORARY ROAD
HELIPAD
MEASURING STATION
COMMUNICATIONS TOWER

PIPE DATA	QUAN
CARRIER - 48" OD x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" OD x 1.034" W.T. GRADE 65	

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REF. DWG. Nº

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy
B Potential buoyant conditions along segment

GENERAL NOTES
1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nº
NWB 970	50-58

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE	848 psi
MAX. OPERATING PRESSURE	680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 159
DOWNSTREAM M.P. 67

Feb 7/74

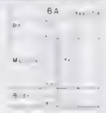
SCALE 1:20000
5 - 27

3B-0200-1015

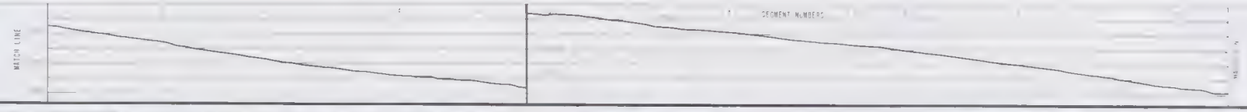
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

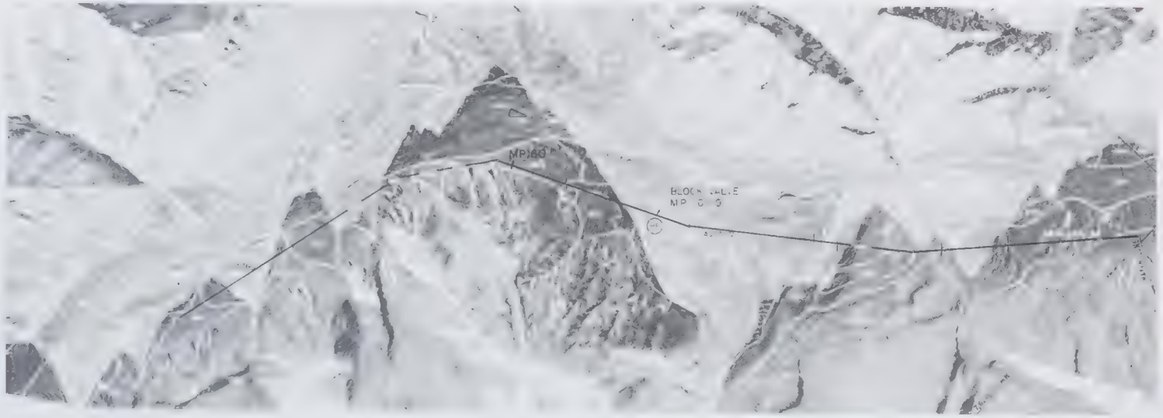
OWNERSHIP

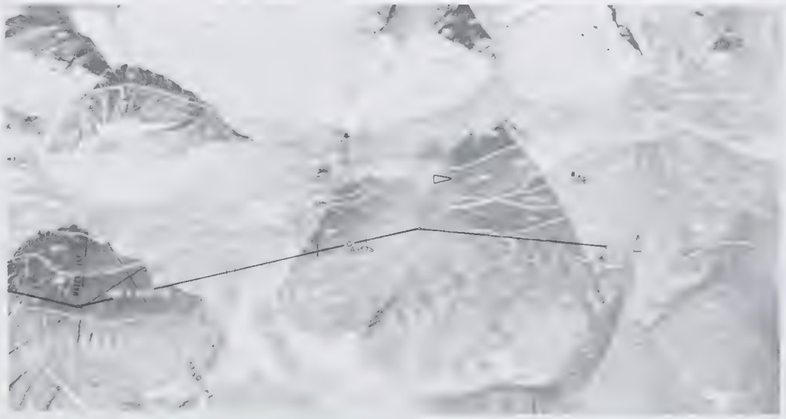
DRILL HOLE DATA

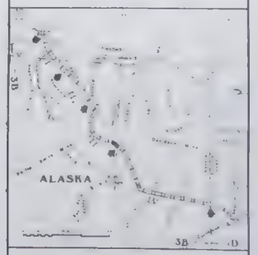


PROFILE



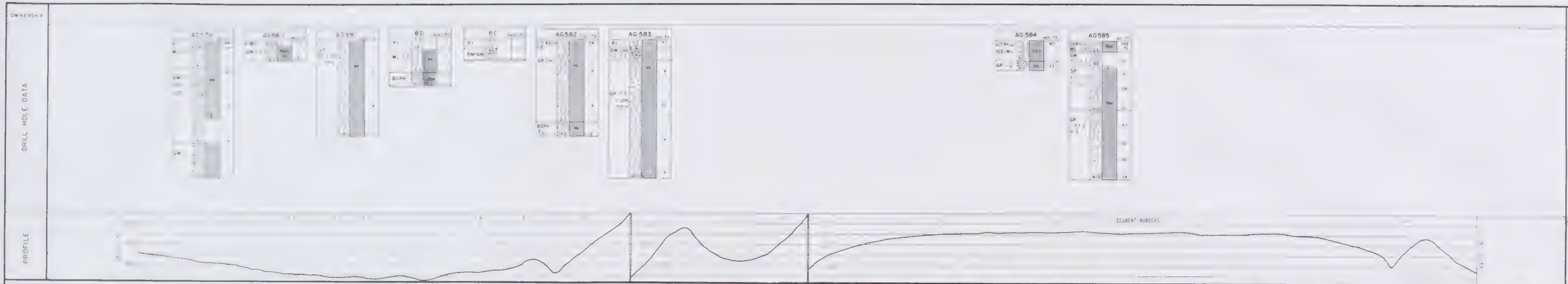


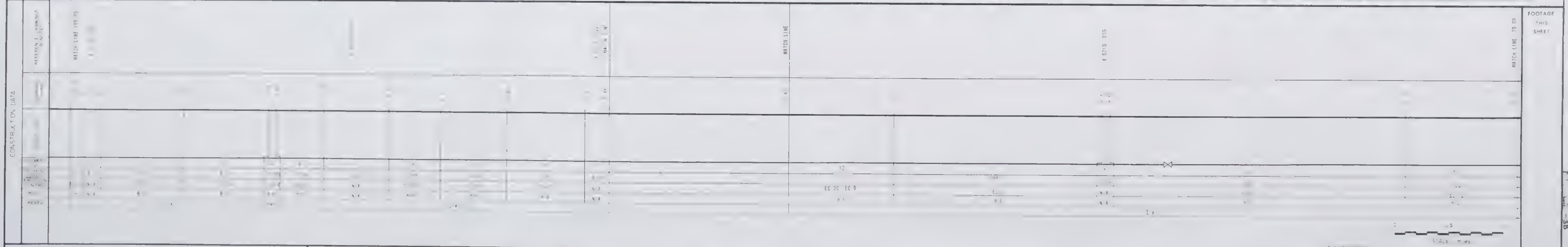




TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

3B-0200-1015





PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- WHARF

PIPE DATA	QUAN
CARRIER - 48"OD x 0.800" W T GRADE 70	
HEAVYWALL - 48"OD x 1.034" W T GRADE 65	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQ'N Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B 0 No buoyancy
- B Potential buoyant conditions along segment
- B 1 Potential buoyant conditions along portions of the segment
- EC Control measures required at steep scarps
- EC Low lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG Nº 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
NW 81970	21-25
103 SE	
NW 81970-	41-45

OPERATING LICENCE Nº	
CONSTRUCTION PERMIT Nº	
MIN TEST PRESSURE	1848 p.s.i.
MAX OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APPRO BY	APPRO BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

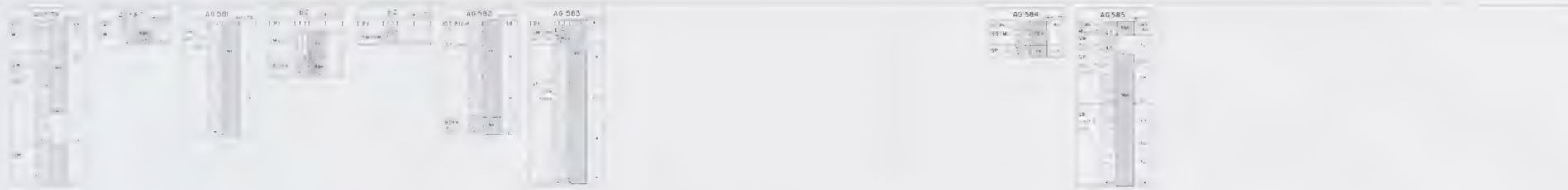
UPSTREAM M.P. 167
DOWNSTREAM M.P. 179

DR. BY
DATE
CHKD BY NK Feb 7/74
APPRO BY Feb 8/74
SCALE 1" = 2000'
SHEET 16 OF 27
3B-0200-1016

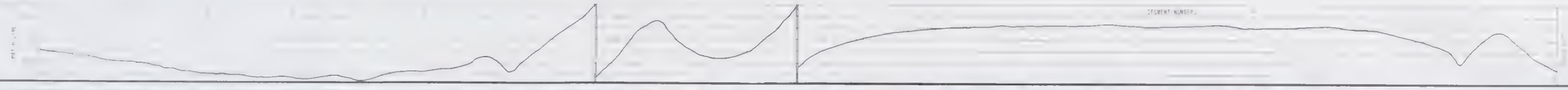
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

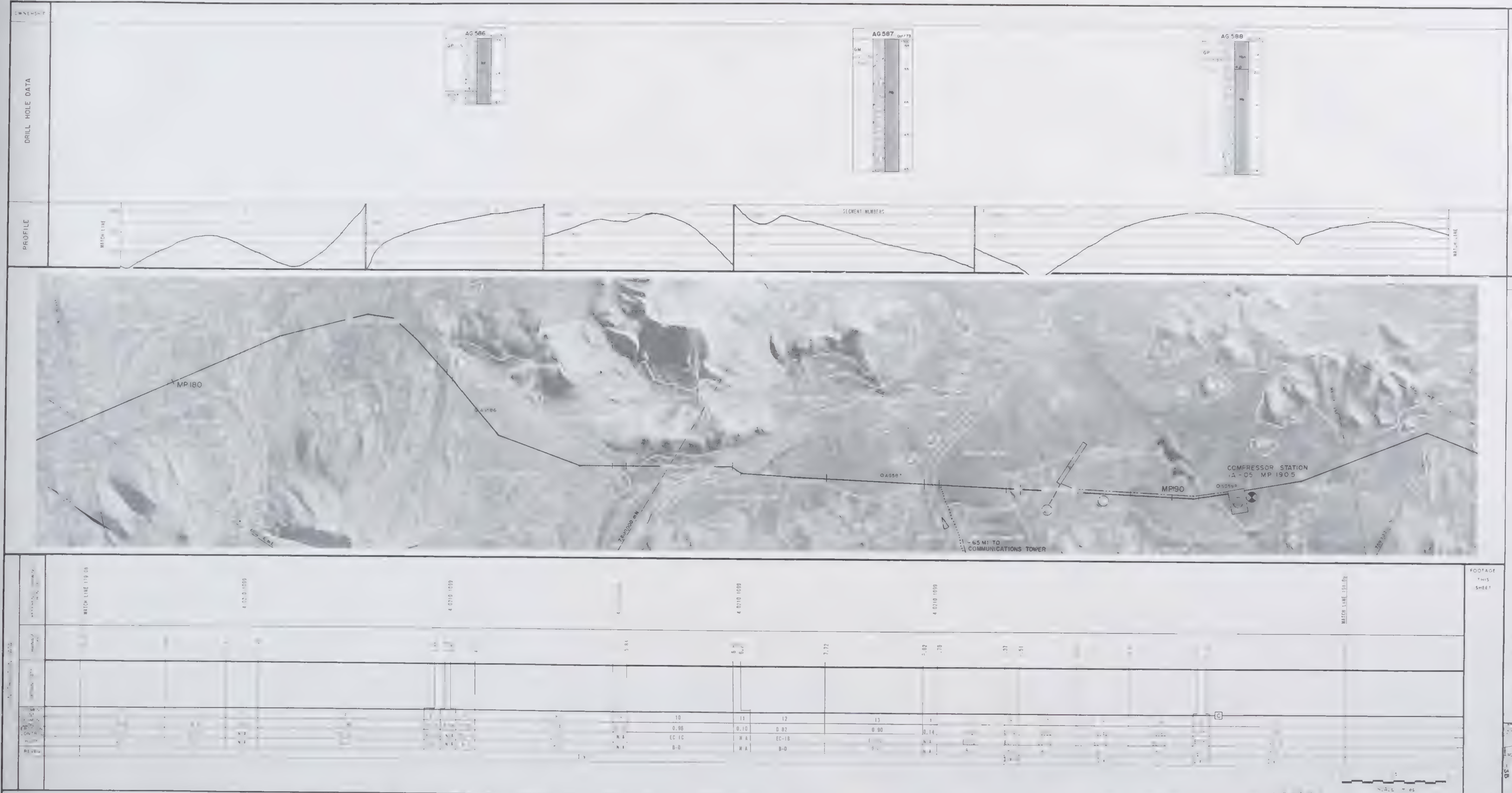


PROFILE



TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

3B-0200-1016



PIPELINE LEGEND

COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
WHARF
PERMANENT ROAD
TEMPORARY ROAD
MEASURING STATION
COMMUNICATIONS TOWER

PIPE DATA	
CARRIER 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	

MISCELLANEOUS MATERIAL

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nº
NW79872 - 5	
NW79872 - 3	

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 848 psi

MAX OPERATING PRESSURE 680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P.

DOWNSTREAM M.P. 192

Feb 7/74

Feb 9/74

SHEET 17 OF 27

3B-0200-1017

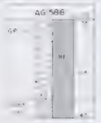
TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

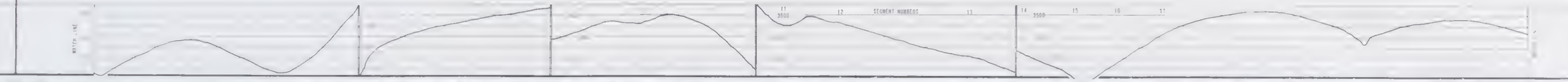
REGINA SASK.

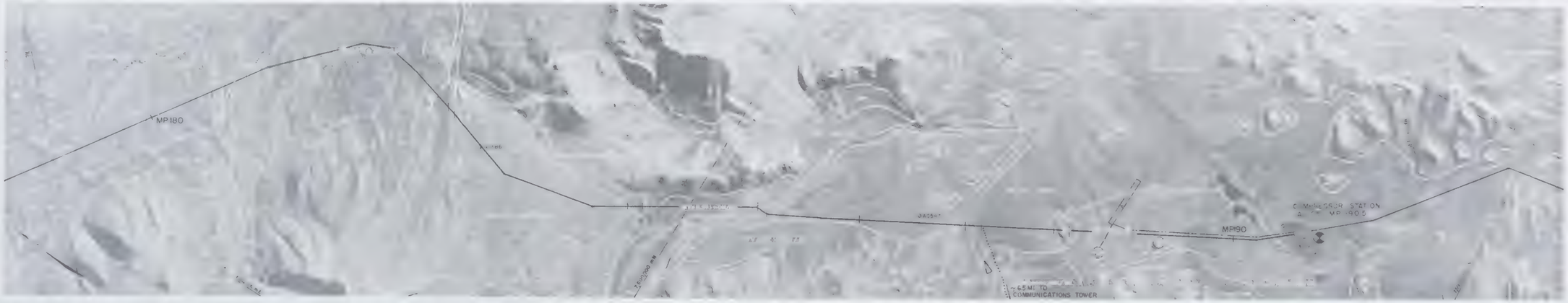
OWNERSHIP

DRILL HOLE DATA



PROFILE





Minor drainage - no winter flow.

Major drainages - no winter flow

Distance: lake - 2.5 mi. es off flog of map
Grayling, broad whitefish, round whitefish, longnose sucker, slimy sculpin
Low winter - level of 3 established gauge
2 Cope - suggest that this lake may not be a overwintering area

Lake trout - Coatsa gray - no summer, but one fishers apparently fish there in winter
Distance and gauge - 2 cop

Very little sized winter herds found here. Many thousands caribou move S.W. and W. in summer. Reverse movement to Canada in late August and early September, individuals and or small groups crossing the route from July - October.
Red fox, wolves, wolverine, short-tailed weasel and Arctic ground squirrel, grizzly bear summer range, potential denning for fall grizzly bears.

A low dwarf shrub - heath complex with birch, Vaccinium spp., birch and sedge.

A low dwarf shrub - heath complex with birch, Vaccinium spp., birch and sedge, Astragalus and lichens.

A dwarf shrub - heath complex with willow, Vaccinium spp., birch and sedge

A low dwarf shrub - heath complex with willow, Vaccinium spp., birch and sedge.

Wet - dwarf shrubs of willow, birch, Ledum, Vaccinium, meadows of sedge, cottongrass and moss in the esker.

Scattered willow, birch, Ledum, Vaccinium and moss in the wet areas of sedge and moss.

Archaeology high priority including compressor station, airstrips, road and borrow pit areas

TERRAIN TYPING

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

38-0200-1017

OWNERSHIP

DRILL HOLE DATA

AG589 AG590 AG591 AG592 AG593

PROFILE

MATCH LINE

SEGMENT NUMBERS

ARCTIC NATIONAL WILDLIFE RANGE

BOUNDARY

MP200

AG591

AG589 AG590

TERRAIN

CONSTRUCTION DATA

MATCH LINE 01-03

SCALE (miles)

U.T.M. GRID ZONE 8

PIPELINE LEGEND

- PERMANENT ROAD
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OF STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF

PIPE DATA

CARRIER - 48" OD x 0.800" WT GRADE 70

HEAVYWALL - 48" OD x 1.034" WT GRADE 65

MATERIAL ANALYSIS MATERIAL

BLOWOUT AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS NO FIELD CONFIRMATION CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL No. 75872 1

OPERATING LICENCE No.

CONSTRUCTION PERMIT No.

MIN. TEST PRESSURE 618 psi

MAX. OPERATING PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. DOWNSTREAM M.P.

SCALE 1:2000

DATE 8 27

3B-0200-1018

ALASKA

3B 1D

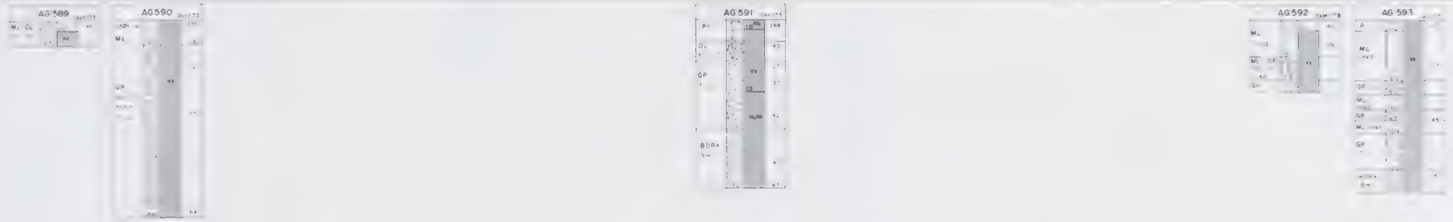
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

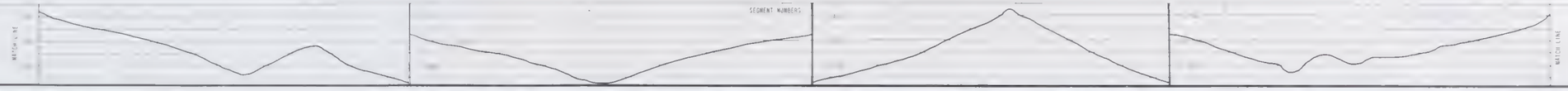
REGINA SASK.

OWNERSHIP

DRILL HOLE DATA



PROFILE



TERRAIN TYPING LEGEND

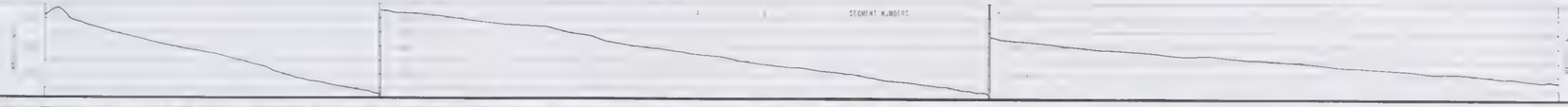
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

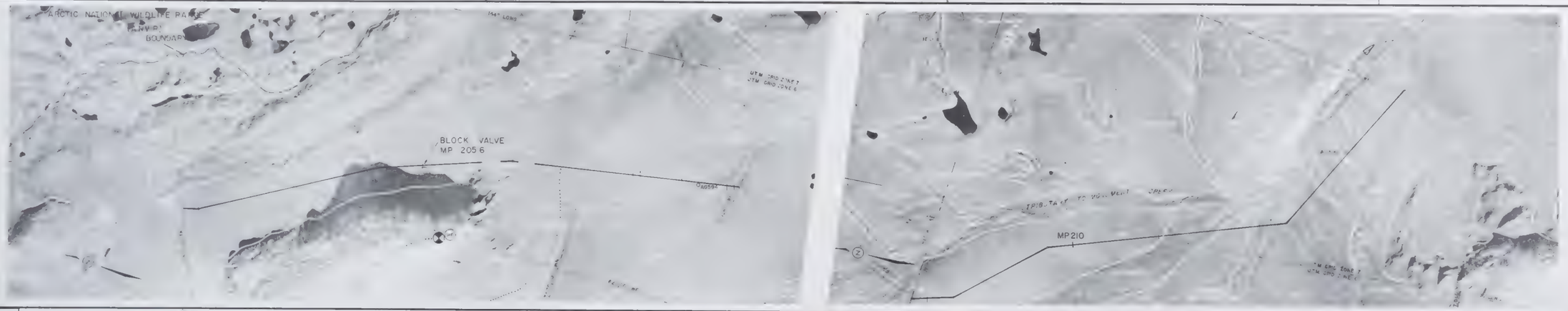
3B 0200 - 018

OWNERSHIP

DRILL HOLE DATA

PROFILE





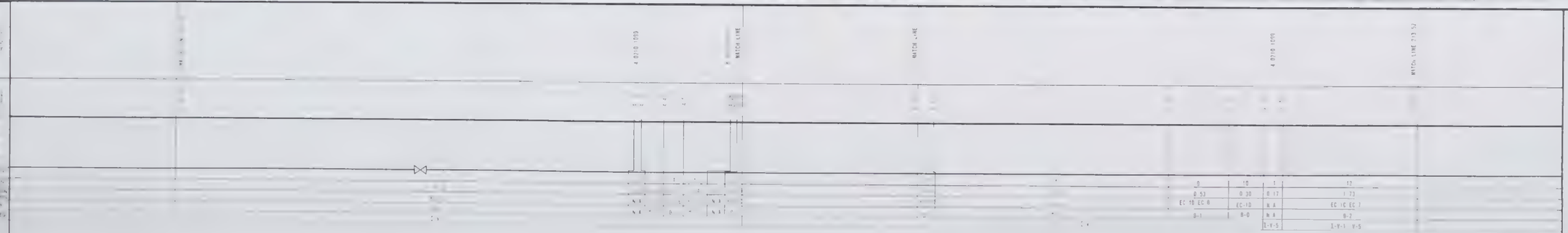
CONSTRUCTION DATA

REFERENCE DRAWING

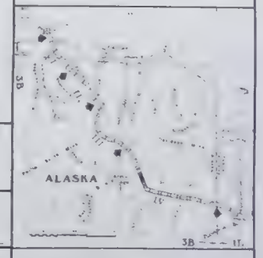
CHAINAGE

PROFILE

REVISIONS



Note: 4 - See Plans No. 252



PIPELINE LEGEND

- 30 in. — SAMPLE PIT (SAMPLE HOLE)
- BORE SITE
- SAMPLE SITE
- SAMPLE WEIGHT
- WATER WEIGHT
- WARNING SIGN
- MILEPOST (ON LANDMARK)
- HANGER FOUNDATION
- FAULT MARKER
- SCREW ANCHOR
- HEAVY WALL PIPE
- ASBAR PIPE
- ANCHOR BLOCK (CONCRETE)
- FLOW DIRECTION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- QUARRY
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE	QUAN
CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQ'N No

DUSTANCY AND EROSION CONTROL LEGEND

- B-0 No Dustancy
- B-1 Potential Dustancy conditions along segment
- B-2 Potential Dustancy conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3% Erodible soil. Control measures required in low stress only
- EC-2 Average slope along segment greater than 3% Erodible soil. Control measures required in low stress only
- EC-3 Average slope along segment less than 3% Non erodible soil. Control measures required in low stress only
- EC-4 Average slope along segment greater than 3% Non erodible soil. Control measures required in low stress only
- EC-5 Average slope along segment less than 3% Erodible soil. Control measures required in all stress categories
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required in all stress categories
- EC-8 Average slope along segment less than 3% Non erodible soil. Control measures required in all stress categories

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. "SEGMENT MILEPOST" EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. 41-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 2.8 FEET

AERIAL PHOTOGRAPHY	
ROLL No	PHOTO Nos
NWR2070	25-30
NWR2970	35-38

OPERATING LICENSE No

CONSTRUCTION PERMIT No

MIN TEST PRESSURE 0.40 P.S.I.

MAX [illegible] 1680 P.S.I.

No	DATE	REVISION	APPD	APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 203 DOWNSTREAM M.P.

DRAWN [illegible] CHECKED [illegible] APPD [illegible] DATE [illegible]

DATE 1 9 27

3B-0200-0.9

TERRAIN MAPPING BY

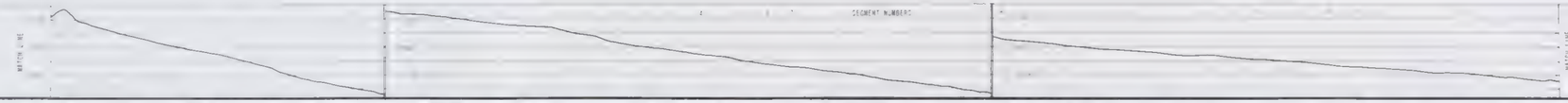
J.C. MOLLARD & ASSOCIATES LIMITED

REGINA SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



Minor drainages - no winter flow

Monument Creek headwaters
Some [illegible] stay [illegible] a subtle [illegible] area
[illegible] water
[illegible]

[illegible] of [illegible] and [illegible] intensity decrease east of confluence of Monument Creek and tributary. Heavy [illegible] on [illegible] August [illegible] important fall migratory route [illegible] cross-ings during late summer and fall especially in Index mountain area.
Moderate and lower activity and short to no wash [illegible] here. Most activity along Monument Creek and streams occasional [illegible] after [illegible] at Monument Creek headwaters
[illegible] near summer range [illegible] suspected on Index Mountains south [illegible]

[illegible]

[illegible]

[illegible]

3B-0200-1019

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

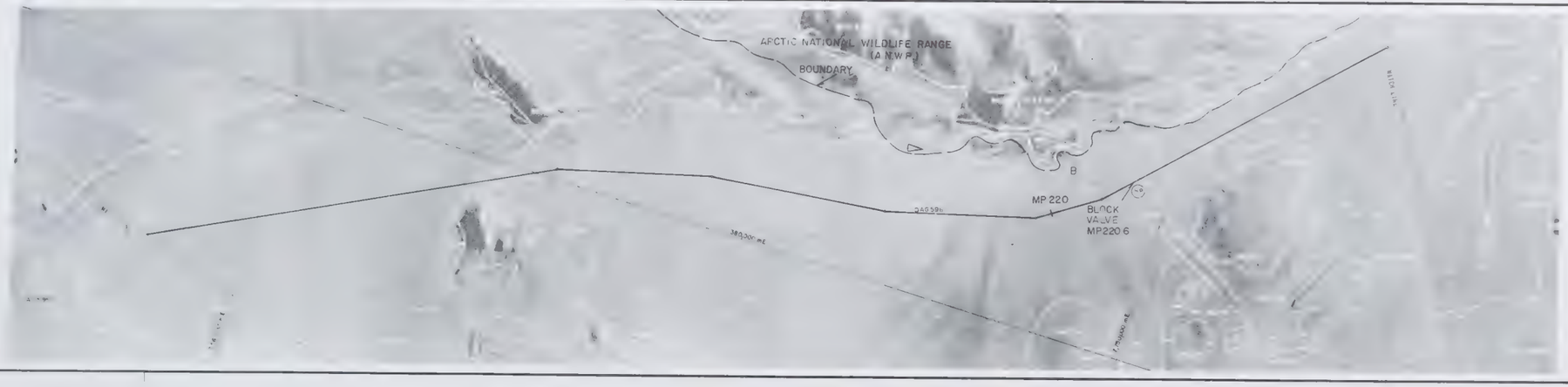
OWNERSHIP

DRILL HOLE DATA

AG 596

PROFILE

SEGMENT NUMBER



CONSTRUCTION DATA

REFERENCE DRAWING & NOTES

MATCH LINE 713.52

MATCH LINE 722.19

FOOTAGE THIS SHEET

SCALE (miles)

J.T.M. GRID ZONE

PIPELINE LEGEND

- ABOVEGROUND LINE VALVE
- ABOVEGROUND PIPE CROSSING
- BURIED VALVE
- BURIED PIPE
- BURIED PIPE CROSSING
- ABOVEGROUND PIPE
- HEAVYWALL PIPE
- ABOVEGROUND PIPE
- ANCHOR BLOCK (BURIED)
- PIPE ANCHOR
- FLOW DIRECTION & DIRECTION OF ANGLE
- FIREWALL 1 HR RATING
- CAMP WALL 1 HR RATING
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- BRIDGE

PIPE DATA

CARRIER - 48" OD x 0.800" WT GRADE 70

HEAVYWALL - 48" OD x 1.034" WT GRADE 65

QUAN

ANCHOR DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQUIRED

BUOYANCY AND EROSION CONTROL LEGEND

B-1 No buoyancy

B- Potential buoyant conditions along segment

B-2 Potential buoyant conditions along segment and other segment

B-3 Potential buoyant conditions along segment

EC- Average slope along segment less than 1° up or down

EC-1 Average slope along segment greater than 1° up or down

EC-2 Average slope along segment greater than 1° up or down

EC-3 Average slope along segment greater than 1° up or down

EC-4 Average slope along segment greater than 1° up or down

EC-5 Average slope along segment greater than 1° up or down

EC-6 Average slope along segment greater than 1° up or down

EC-7 Average slope along segment greater than 1° up or down

EC-8 Continuous slope over segment

EC-9 Continuous slope over segment

EC-10 Continuous slope over segment

EC-11 Continuous slope over segment

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEGMENT MILEPOST EQUALS MATCH LINE M LEPOST PLUS CHAINAGE VALUE

3 SEE DWG. A 0800 1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL Nº

PHOTO Nº

NW 8-510

SO N

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 840 p.s.i.

MAX OPERATING PRESSURE 680 p.s.i.

Nº	DATE	REVISION	APPRO BY	APPRO BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

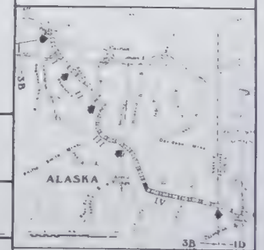
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 219 DOWNSTREAM M.P. 223

SCALE 1" = 2000'

38-0200-1020



TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

DRILL HOLE DATA

PROFILE

TERRAIN TYPING LEGEND

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

38-0200-1020

OWNERSHIP

DRILL HOLE DATA

AG597

AG598

AG599

PROFILE

MATCH LINE

SEGMENT NUMBERS

300

CONSTRUCTION DATA

MATERIAL TRANSIT

MATERIAL TRANSIT

EROSION DATA

SOIL

WELDING

MATCH LINE

4 010-1000

4 010-1000

MATCH LINE

FOOTAGE THIS SHEET

SCALE 1 mile

U T M ZONE 3

PIPELINE LEGEND

- PIPELINE
- ABOVE GROUND PIPELINE
- ERW BRIDGE
- BURIED PIPELINE
- RIVER WEIGHT
- PIPELINE CROSSING
- SCREW ANCHOR
- WELL
- PIPELINE
- ABOVE GROUND PIPELINE
- PIPELINE
- TEMPORARY ROAD
- RELIEF
- MEASURING STATION
- COMMUNICATIONS TOWER
- BLOCK VALVE
- WINTER TRAIL
- HEAVY EQUIPMENT
- AIR STRIP
- STOCKPILE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BRIDGE
- BUOY

PIPE DATA	QUAN
CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQ'N NO

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy

B 1 Potential buoyant conditions along segment

B 2 Potential buoyant conditions along portions of the segment

B 3 [illegible]

EC 1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only

EC 2 Average slope along segment greater than 3° Erodible soil. Close spaced control measures required

EC 3 Average slope along segment less than 3° Non erodible soil. Minimal control measures required

EC 4 Average slope along segment greater than 3° Non-erodible soil. Control measures required

EC 5 [illegible]

EC 6 [illegible]

EC 7 [illegible]

EC 8 [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS THE NEXT 4 DIGITS

3. SEE DWG. 4-0000-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nº
NR 19970	

OPERAT NO LICENSE NO.

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 1848 psi

MAX [illegible] 68 psi

NO	DATE	REVISION	APPR'D	APPR'D

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 223 DOWNSTREAM M.P.

DRAWN [illegible] DATE [illegible]

CHECKED [illegible] DATE [illegible]

APPROVED [illegible] DATE [illegible]

DWG. NUMBER 3B-0200-02

SHEET 2 OF 27

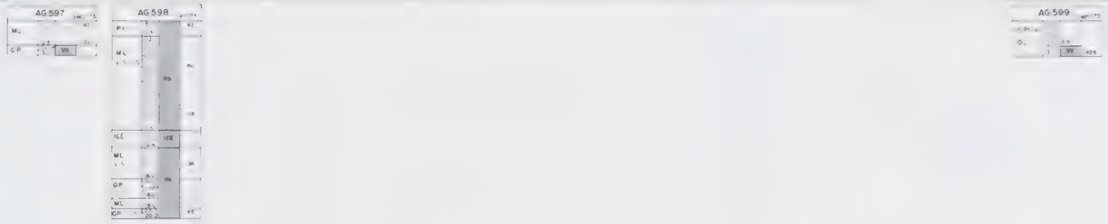
TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA SASK.

OWNERSHIP

DRILL HOLE DATA



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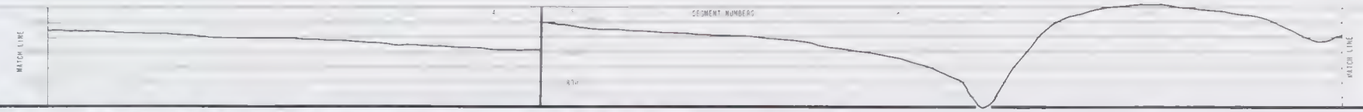
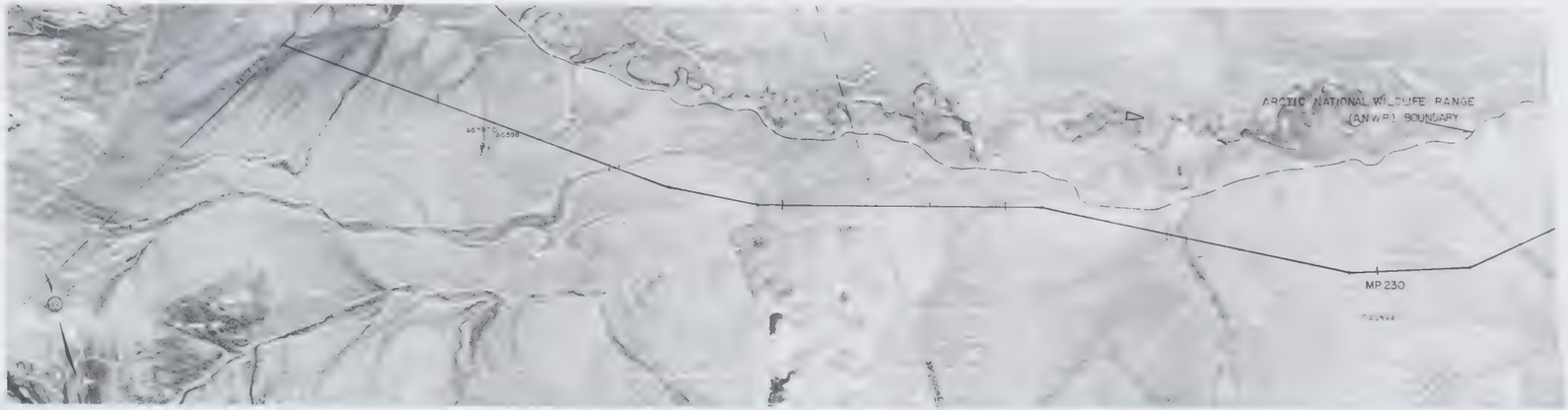




Movement Creek
movements previews page
stream ... para ... for some 30 miles
important grayling stream

Tributary
... spawning ... number of grayling
Move ... low
Sensitive May 1 - Nov. 1

Potential for wintering caribou - numbers varying greatly, spring migratory route - herd sizes vary greatly from year to year, heavy summer utilization, movements parallel and cross route during August breakup, fall migratory route parallel ... and crossing proposed pipeline route, greatly varying numbers of wintering moose in willow stands.
Both wolverine, red fox, marte, beaver, ... are found here.
Good summer bear range, spring and fall - grizzly bear movement along Movement Creek, black bears present but not as numerous.

Scattered white spruce with ...	Scattered	heath, alder and willow	with sedge where wet	birch, ... low sedge and heath	Scattered white spruce, heath, alder and ... understory, ...
					Scattered white spruce with heavy shrubs ... low ... and heath; white spruce savanna with heath, dominated by sedge and scattered ... white spruce and ... low shrub ...

Archaeology indicating ... Probable caribou fences

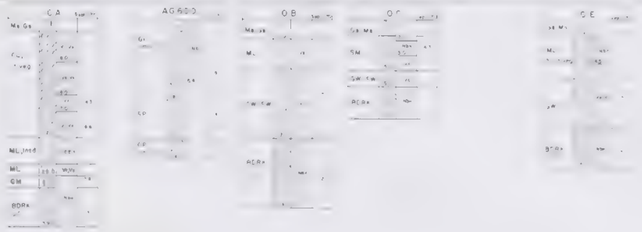
TERRAIN TYPES

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

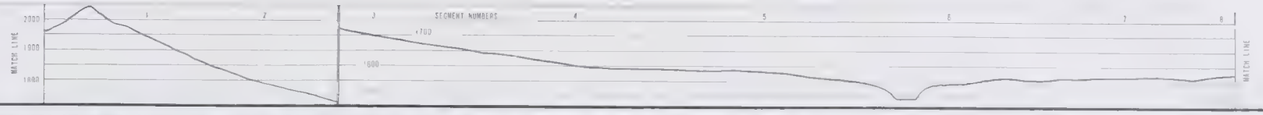
38-0200-1021

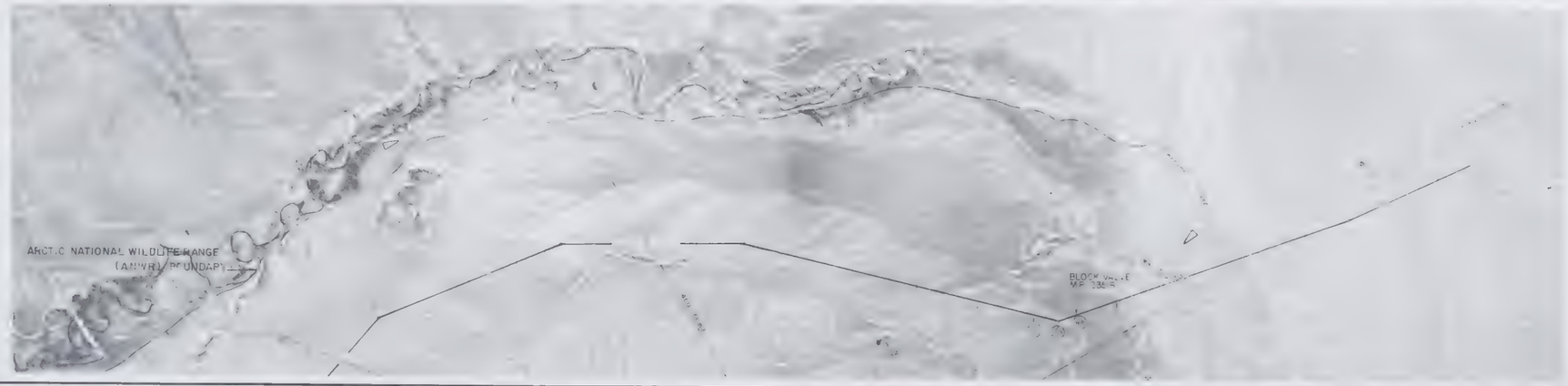
OWNERSHIP

DRILL HOLE DATA



PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES

MATCH LINE 230.00

4.0010 1009

MATCH LINE 238.50

FOOTAGE THIS SHEET

DESIGN DATA

REVISIONS

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- HEADLINING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- BORROW SITE
- WHARF

PIPE	WALL
CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	

COATING DATA

MATERIALS & WATER	
QUAN	DESCRIPTION

BUOYANCY AND EROSION CONTROL LEGEND	REQM NO
B 0 No Buoyancy	
B 1 Potential buoyant conditions along segment	
B 2 Potential buoyant conditions along portions of the segment	
N A Not [illegible]	
EC 1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only	
EC 2 Average slope along segment greater than 3° Erodible soil. Close spaced control measures required	
EC 3 Average slope along segment less than 3° Non erodible soil. Minimal control measures required	
4 Average slope along segment greater than 3° Non erodible soil. Control measures required in low areas only	
EC 5 Unstable water course. Dewater before required along segment	
EC-6 Control measures required on top sidehslope	
EC [illegible]	
EC 8 [illegible] Must be in place prior to any site work	

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. THE TIME CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 0.9 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
NW 79870 07	37 44

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MAX OPERATING PRESSURE 1680 PSI

REV	DATE	APPD BY	APPD BY
1			
2			
3			
4			

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 221 DOWNSTREAM M.P. 238

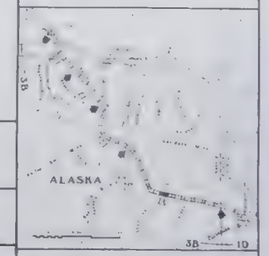
DRN BY	DATE

APPROVED BY

SCALE 1:2000

SHEET 22 OF 27

38-0200-1022



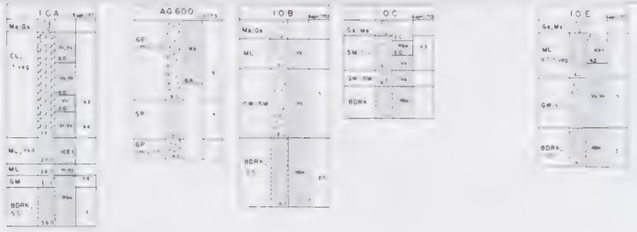
TERRAIN MAPPING BY

W.D. MOLLARD & ASSOCIATES LIMITED

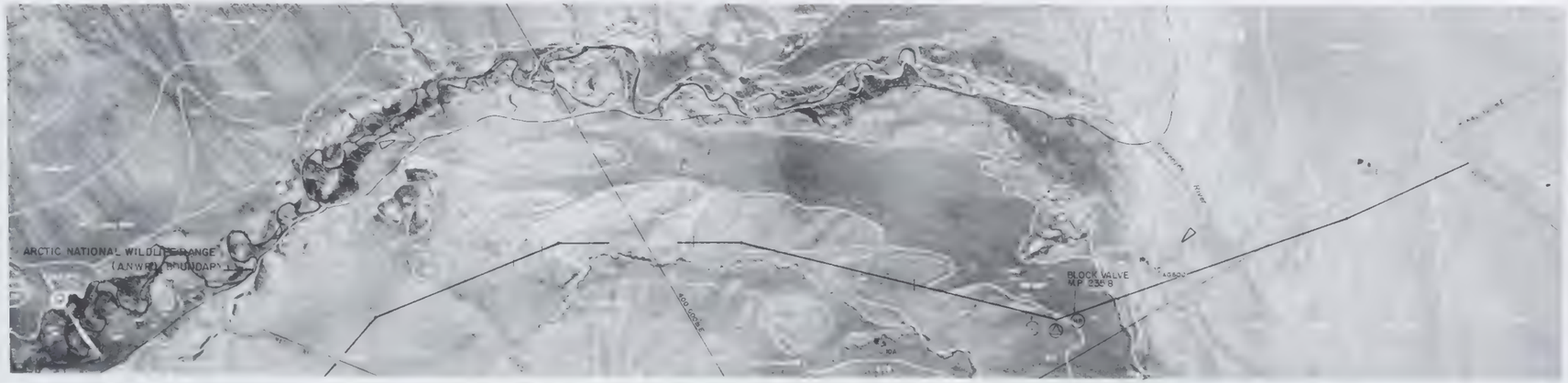
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

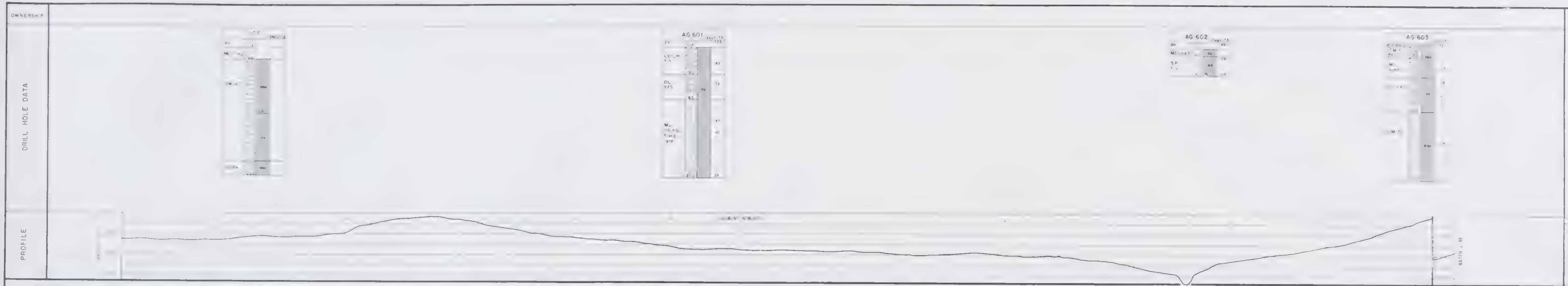


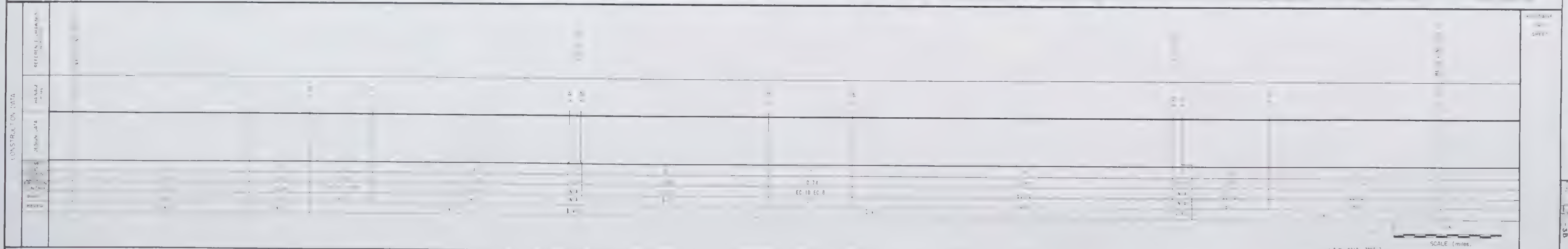
PROFILE



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

3B-0200-1022





PIPELINE LEGEND

PERMANENT ROAD
MEASURING STATION
COMMUNICATIONS TOWER
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
WHARF

PIPE DATA	PLAN
CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL 48" OD x 1.034" WT GRADE 65	

PLAN	DESCRIPTION	DRAWING Nº

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No Buoyancy
B Potential buoyant conditions along segment
B 2 [illegible]
EC [illegible]
EC 1 [illegible]
EC 4 [illegible]
EC 5 [illegible]
EC 6 [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nº
NW 1 4871 - 45W	58 - 6-

OPERATING LICENSE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 848 psi
MAX OPERATING PRESSURE 680 psi

Nº	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

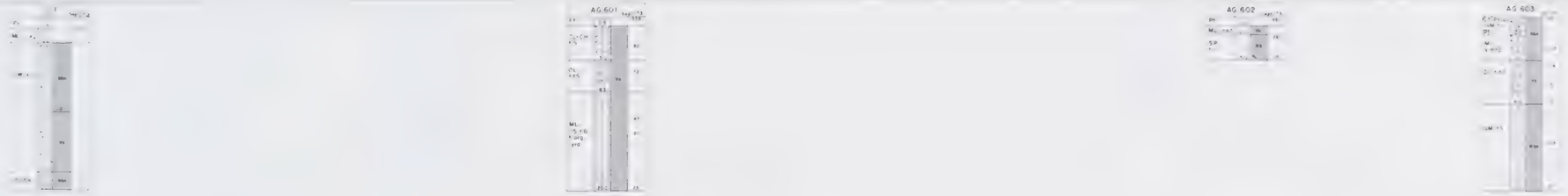
UPSTREAM M.P. 238
DOWNSTREAM M.P. 251

DRN BY
CHKD BY MFF Feb 74
APPD BY
SHEET 23 OF 27
3B-0200-1023

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA



PROFILE

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

3B-0200-1023

DRILL HOLE DATA

AG-604

AG-605

PROFILE

SEGMENT NUMBERS

COMPRESSOR STATION

MP260

CONSTRUCTION DATA

MATCH LINE

FOOTAGE THIS SHEET

U.T.M. GRID ZONE 7

SCALE (miles)

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WATER WELL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OF STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- DWARF

PIPE DATA	QUAN
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQN NO

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- B-4 [illegible]
- EC [illegible]
- EC-1 [illegible]
- EC-2 [illegible]
- EC-3 [illegible]
- EC-4 [illegible]
- EC-5 [illegible]
- EC-6 [illegible]
- EC-7 [illegible]
- EC-8 [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. A 0000-1000 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.6 FEET

AERIAL PHOTOGRAPHY		
ROLL Nº	PHOTO Nº	
NB 4871-43B	32	34
NB 11871-44E	50	57

PERMIT NO. (OPEN) Nº

CONSTRUCTION PERM. Nº

MIN. TEST PRESSURE	1848 psi
MAX. OPERATING PRESSURE	1680 psi

Nº	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

U.S.A.

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

DRAWN BY [illegible] CHKD BY [illegible] APPD BY [illegible]

SCALE 1" = 2000'

SHEET 24 OF 27

3B-0200-1024

TERRAIN MAPPING BY

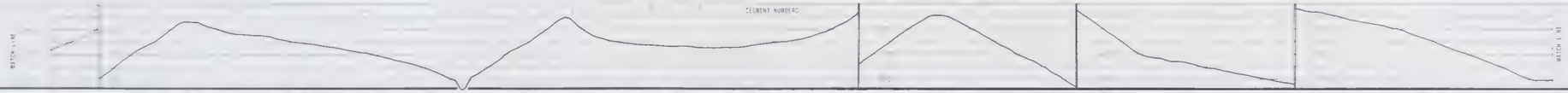
J.D. MOLLARD & ASSOCIATES LIMITED

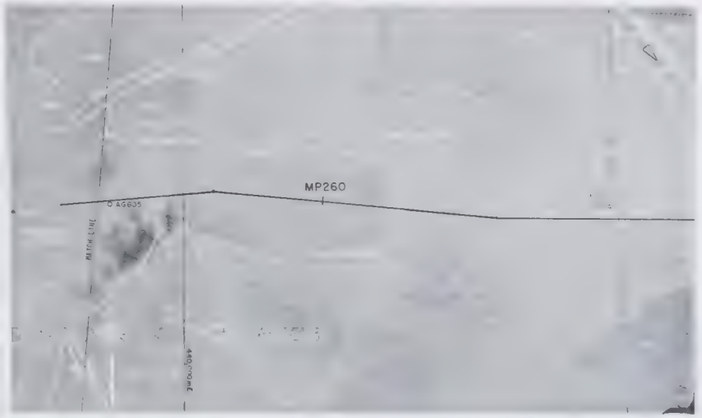
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE





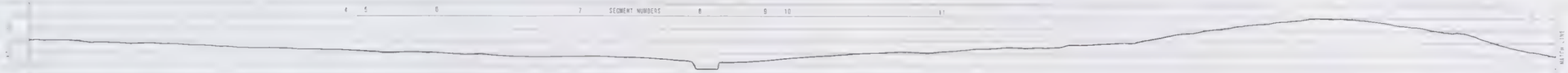
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

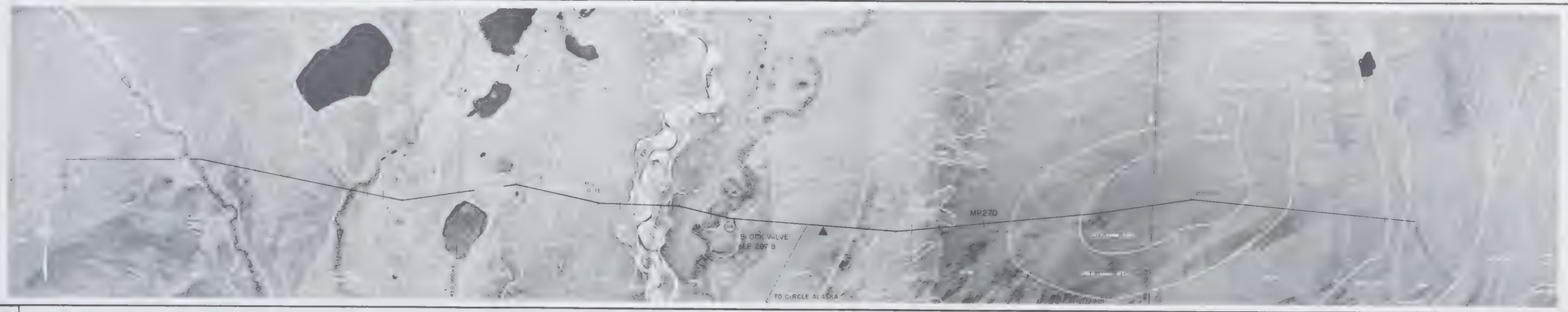
3B-0200-1024

OWNERSHIP

DRILL HOLE DATA

PROFILE





CONSTRUCTION DATA

REFERENCE FOOTAGE IN FEET

MATCH LINE 251.90

4 0110 099

4 0110 099

4 0110 099

4 0110 099

MATCH LINE 273.75

FOOTAGE THIS SHEET

U.T.M. GRID ZONE

SCALE TRUE

PIPELINE LEGEND

- PERMANENT ROAD
- TEMP. HAUL ROAD
- AIR TRAIL
- MEASURING STATION
- COMMUNICATIONS TOWER
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- QUARRY

CARRIER - 48" OD x 0.800" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REGN NO

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy

B-1 Potential buoyant conditions along segment

B-2 Potential buoyant conditions along portions of the segment

B/A Refer to river crossing drawing

EC-1 Average slope along segment less than 3° Erodible soil Control measures required

EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required

EC-3 Average slope along segment less than 3° Non erodible soil Minimal control measures required

EC-4 Average slope along segment greater than 3° Non erodible soil Control measures required in ten areas only

EC-5 Unstable water course Temporary barrier required along segment

EC-6 Control measures required on steep sideslopes

EC-7 Control measures required at steep exposures

EC-8 Low lying sensitive areas Measures to minimize micro drainage

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG 4 0200 1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

OPERATING LICENCE No	
CONSTRUCTION PERMIT No	
MIN TEST PRESSURE	1848 psi
MAX OPERATING PRESSURE	1680 psi

DRN BY		DATE	
CHKD BY		7/74	
APPD BY		7/74	

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

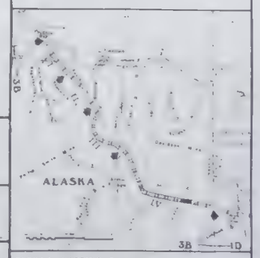
ALASKA

UPSTREAM M.P. 251 DOWNSTREAM M.P. 274

SCALE 1" = 1000'

SHEET 25 OF 27

3B-0200-1025



TERRAIN MAPPING BY

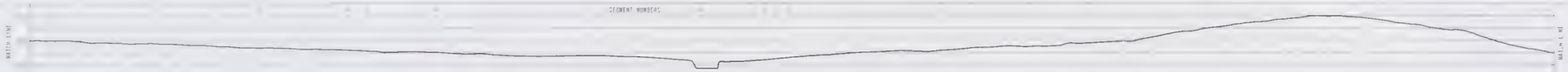
J.D. MOLLARD & ASSOCIATES LIMITED

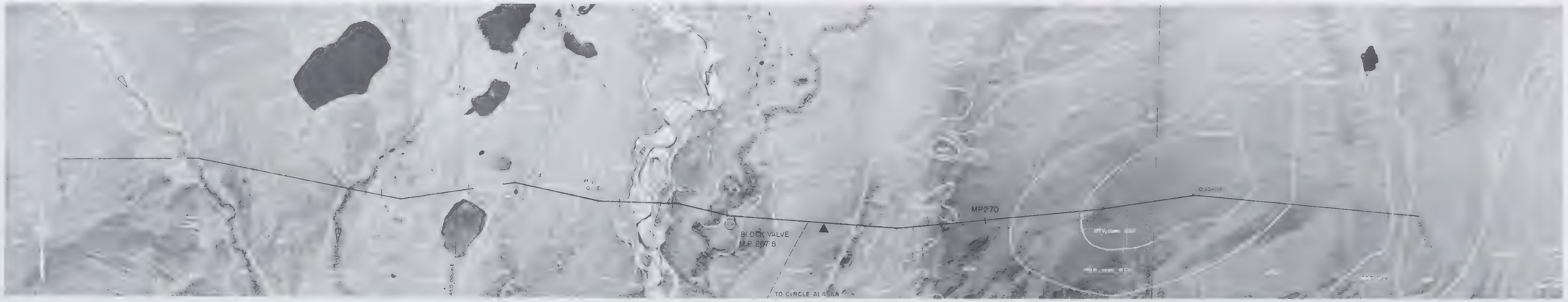
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA

PROFILE





Coleen River - Grayling
important feeding area for grayling and other species.
No water flow at this location, but an open water was observed
[illegible]
Seasonally - Nov 1

Thousands of caribou may cross route during May - mid-June, activity increases to east. Strong caribou movements parallel and cross route. Largest kills occur in some years. Tall movements parallel route - intensity of movements vary.
Grizzly bear range

Coleen River and valley - beaver, lynx, snowshoe hare, wolves, wolverine, red fox, marten, muskrat, otters, mink, weasel, bald eagle, some black bear, lesser cross

Marten, lynx, muskrat are common, mink, beaver, not particularly otter

Scattered white spruce in the whole subzone. Forests in the middle and upper part of the valley

White spruce in the some lowlands and in flow sedge and the valley story

Sedge, cottongrass, cross, moss in the some valley bottom sedge

Scattered groves of white spruce, willow and dense moss and cottongrass sedge

Open white spruce [illegible] no data, willow and moss in drier types

[illegible] white spruce, greater soil water, scattered willow, sedge

Open white spruce [illegible] sedge, [illegible] moss [illegible]

Archaeology high priority

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

3B-0200-1025

OWNERSHIP

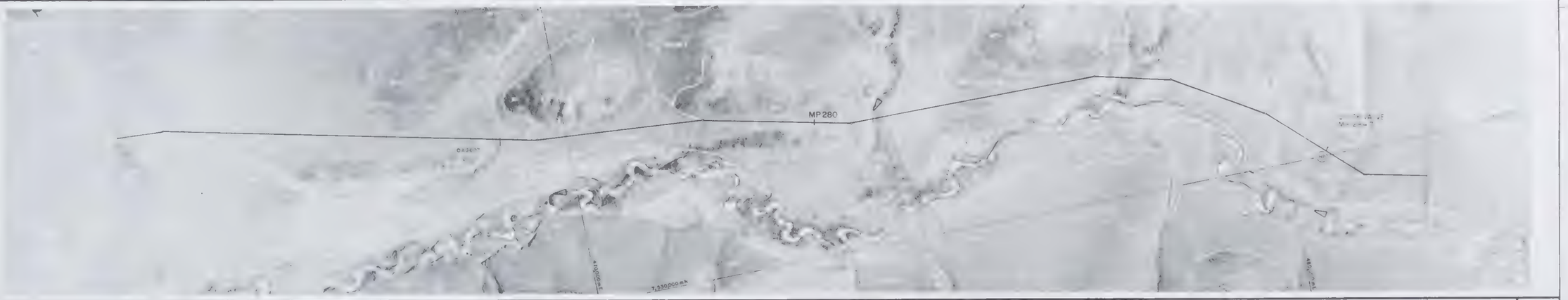
DRILL HOLE DATA

AG 607

PROFILE

SEGMENT NUMBERS

MATCH LINE



CONSTRUCTION DATA

REFERENCE DRAWINGS

MATCH LINE 273.75

MATCH LINE 285.25

FOOTAGE THIS SHEET

PIPELINE LEGEND

PERMANENT ROAD
TEMPORARY ROAD
HELIPAD
WEATHERMAL STATION
COMMUNICATIONS TOWER
SOS VALVE
WINTER TRAIL
COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW LOCK
BRIDGE

PIPE	WALL
CARRIER - 48" O.D x 0.800" WT GRADE 70	
HEAVYWALL - 48" O.D x 1.034" WT GRADE 65	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQN No

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS IN A NATURAL RESOURCE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. A-0200-100 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL No	PHOTO Nos
90/0205	38 41

OPERATING LICENCE No

CONSTRUCTION PERMIT No

MIN TEST PRESSURE 948 psi

MAX OPERATING PRESSURE 680 psi

	DATE			APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

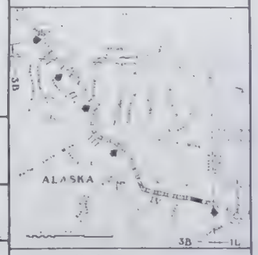
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

UPSTREAM M.P. 274 DOWNSTREAM M.P. 285

SCALE 1:20000

SHEET 26 OF 27

3B-0200-1026

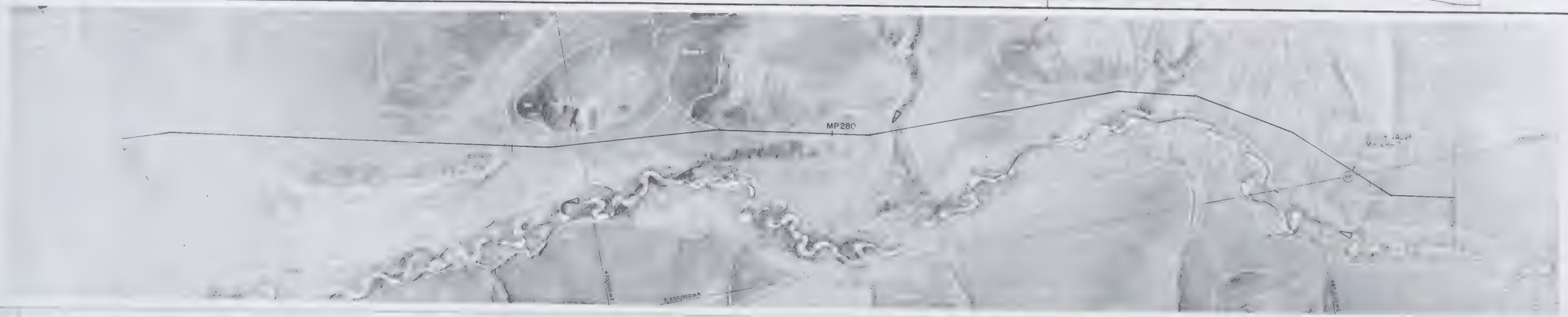


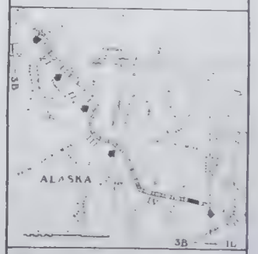
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE





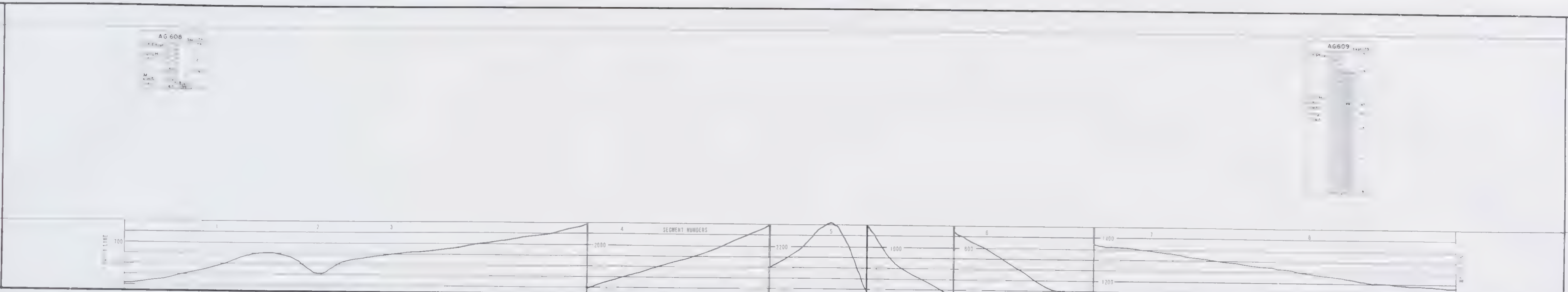
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

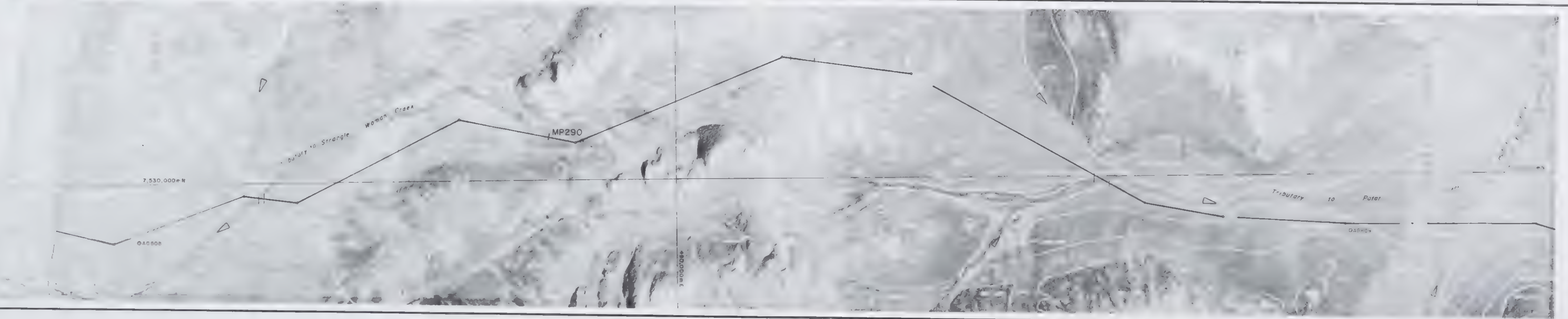
3B-0200-026

OWNERSHIP

DRILL HOLE DATA

PROFILE





TERRAIN

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	MATCH LINE 285 87	4-0210-1009				4-0210-1009		MATCH LINE 297 47
CHAINAGE (miles)	00 00	1 75 1 80	3 01	6 43	6 63	9 12	9 27	11 80

SEGMENT Nº	1	2	3	4	5	6	7	8
SEGMENT LENGTH	1 75	0 05	1 21	3 42	0 20	2 49	0 15	2 53
EROSION CONTROL	EC 1C	N A	EC 1D	EC-1C	EC-1C	EC 1D	N A	EC-1C
BUOY	B 0	N A	B-0	B-2	B-1	B-0	N A	B 2
REVEG	I-V-2	I-V-5	I-V-1				I-V-5	I-V-2

FOOTAGE THIS SHEET

0 0.5 1.0
SCALE (miles)

PIPELINE LEGEND

- CARRIER PIPE
- BERM BREAK
- FROST ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK
- POINT OF INTERSECTION
- WARNING SIGN
- COMPRESSOR STATION
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE

PIPE DATA	QUAN
CARRIER - 48" OD x 0.800" W T GRADE 70	
HEAVYWALL - 48" OD x 1.034" W T GRADE 65	

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQ'N Nº

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
N/A Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2 [illegible]
EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC-5 Unstable water course. Deeper burial required along segment
EC-6 Control measures required on steep sideslopes
EC-7 Control measures required at steep scarps
EC-8 [illegible] micro drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
TC2005	34 - 39

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APP'D BY	APP'D BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

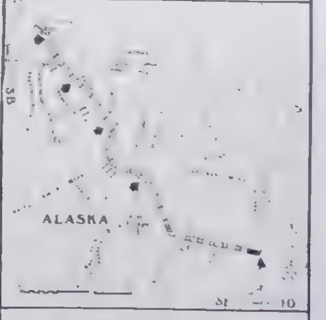
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 286
DOWNSTREAM M.P. 297

DRN BY
DATE
CHKD BY
APP'D BY

SHEET 27 OF 27

3B-0200-1027



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

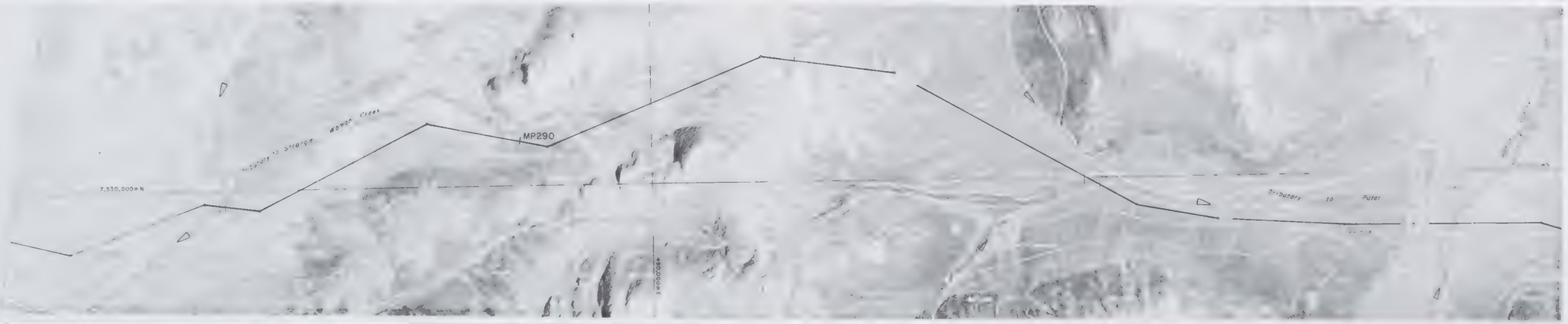
DRILL HOLE DATA

A3608

A3609

PROFILE

SEGMENT NUMBERS



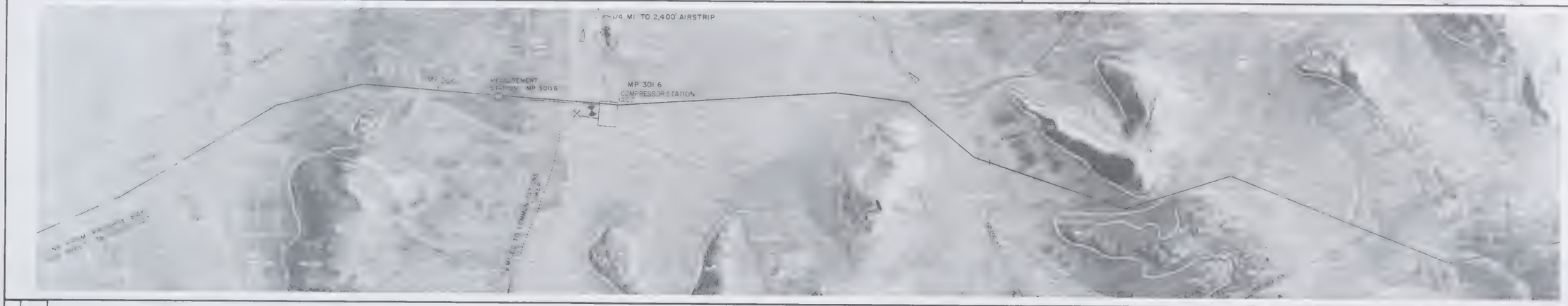
TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

38-0200-1027

OWNERSHIP

DRILL HOLE DATA

PROFILE



CONSTRUCTION DATA

FOOTAGE THIS SHEET

PIPELINE LEGEND

PERMANENT ROAD
TEMPORARY ROAD
HELIPAD
COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
BARGE

MAJOR ANOMALOUS MATERIAL

SUBSIDENCE AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

3 SEE DWG. A-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER 1.5 METRES

AERIAL PHOTOGRAPHY

ROLL Nº

PHOTO Nºs

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

M.N. TEST PRESSURE

MAX. OPERATING PRESSURE 1680 psi

NO	DATE	REVISION

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. 0 DOWNSTREAM M.P. 1

SCALE 1" = 1000'

SHEET 1 OF 14

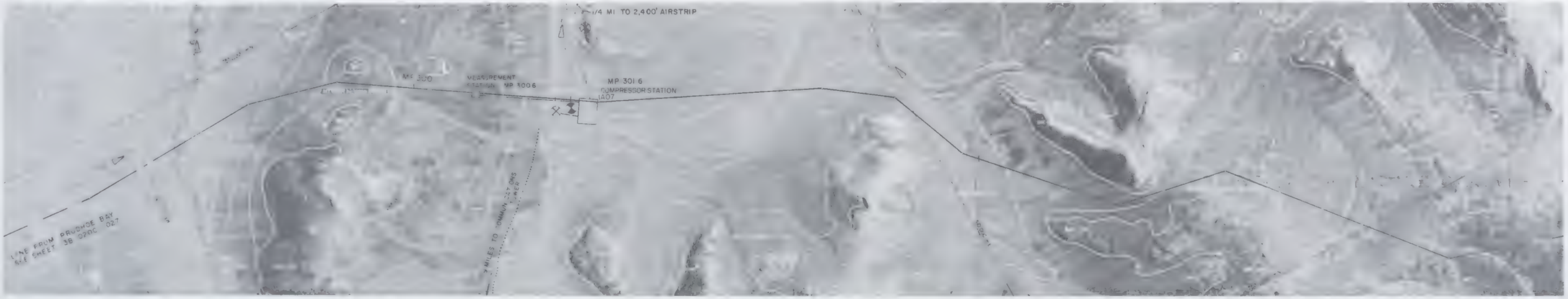
1D-0200-1001

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



Potato Creek
Spring flow [illegible]
Anadromous salmon spawning

Surprise Creek
Grayling [illegible]
Grayling spawning and rearing [illegible]
No winter flow
Sensitive May 1 - Nov. 1

Potato Creek - beaver habitat downstream, close to 0.22 y, also moderately 5 fe.

Caribou spring and fall migration and some fall and winter range, some winter range for red fox and wolves.

Surprise Creek beaver habitat downstream, close to 0.22 y, local grizzly, local grizzly route. Potentially sensitive [illegible]

Caribou spring and fall migration route, some fall and winter range, some winter range for red fox and wolves. Potentially sensitive as denning area Nov. - May

To Infirry of Surprise Creek - sensitive [illegible]

[illegible]

Caribou [illegible]

Anadromous fish spawning [illegible]
[illegible]
[illegible]

TERRAIN TYPE NO.

[illegible]

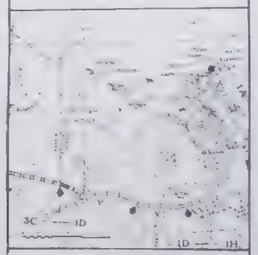
Wetland features

[illegible]

Trees and shrubs

PT Impoverished peatland, peat generally less than 5 ft thick.

SB Stunted bog, ribbed and reticulated fens, peat generally less than 5 ft thick.



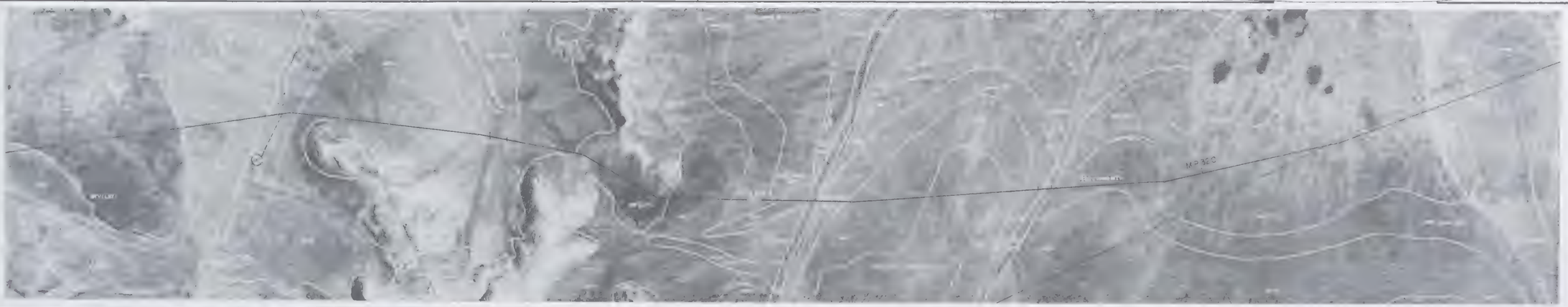
TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

1D-0200-1001

OWNERSHIP

DRILL HOLE DATA

PROFILE



CONSTRUCTION DATA

REFERENCE DRAWING NO. B-1-1

MATCH LINE 1-1

MATCH LINE 3-3

FOOTAGE THIS SHEET

REVISIONS

UTM GRID ZONE

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

PIPELINE LEGEND

- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WASP
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MONITORING STATION
- COMMUNICATIONS TOWER
- BURIED VALVE
- WINTER TRAIL

PIPE DATA

CARRIER - 48" O.D. x 0.720" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN NO

BIOTABLE FACTORS OR OTHER LEGEND

B 0 No buoyancy
B 1 Potential buoyant force along segment
B 2 Potential buoyant conditions along each end of the segment

EC 1 Average slope along segment greater than 3° Feasible but cross section control measures required
EC 2 Average slope along segment less than 3° Not feasible
EC-0 Control measures required on steep side slopes

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG. 4 [illegible] FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 2.8 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
[illegible]	

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE [illegible] psi

MAX OPERATING PRESSURE [illegible] psi

DATE	REVISION	APP.	APPR.

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

DRAWN	DATE		
CHECKED	DATE		
APPR. BY	DATE	SCALE	
		SHEET 2 OF 4	D 0200-002

OWNERSHIP

DRILL HOLE DATA

PROFILE

and winter range.

Potential grizzly bear denning area. Caution [illegible] avoid [illegible] area.

Caribou spring and fall migratory route. [illegible]

Features Legend

P1 Unaltered peat land, peat generally less than 3 ft thick

S3 Strong (e.g. ribbed and recirculated fens, peat generally [illegible])

TERRAIN MAPPING BY

J D MOLLARD & ASSOCIATES LIMITED

REGINA, SASK

1D-0200-1002

OWNERSHIP

DRILL HOLE DATA

PROFILE

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES

MATCH LINE 322.47

MATCH LINE 332.70

FOOTAGE THIS SHEET

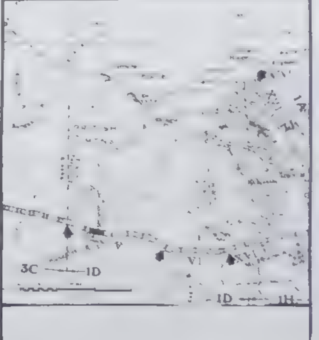
SEGMENT	1	2	3	4	5	6	7	8	9	10	
EROSION CONTROL	EC 1C	EC 2	EC 1C	EC 8	EC 1C EC 1B	N A	EC- B	EC 8	EC-1C	EC -	N A	EC 8
BUOY.	B 0	B 1	B 0	B	B 0	N A	B 2	B-	B 0	B	N A	B 0
REVEG.	I V 2					I V 6				I V 2	

J T M GRID ZONE 7

0 0.5 1.0
SCALE (miles)

Peat and peats

SB String bog, ribbed and reticulated fens, peat generally less than 5 ft thick



TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN (AIRCRAFT)
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN
CARRIER - 48" OD x 0.720" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN Nº

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy
B 1 Potential buoyant conditions along segment
B 2 Potential buoyant conditions along part only of the segment
N A Refer to river crossing drawing
EC 1 Average slope along segment less than 3° Erodible soil. Control measures required in few areas only
EC 2 Average slope along segment greater than 3° Erodible soil. Close spaced control measures required
EC 3 Average slope along segment less than 3° Non-erodible soil. Minor control measures required
EC 4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in few areas only
EC 5 Unstable soils [illegible] required along segment
EC 6 Control measures required on steep sideslopes
EC 7 Control measures required at steep scarps
EC 8 [illegible]

GENERAL NOTES
1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG 4 0200 OC1 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
NW 113871 35	22 - 28

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 2100 psi
MAX OPERATING PRESSURE 1680 psi

Nº	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

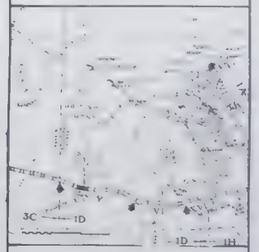
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY
UPSTREAM M.P. 322 DOWNSTREAM M.P. 332

DRN BY
CHKD BY
APPRD BY
DATE Jan 14/
SCALE 1" = 2000
SHEET 3 OF 14
1D-0200-1003

OWNERSHIP

DRILL HOLE DATA

PROFILE

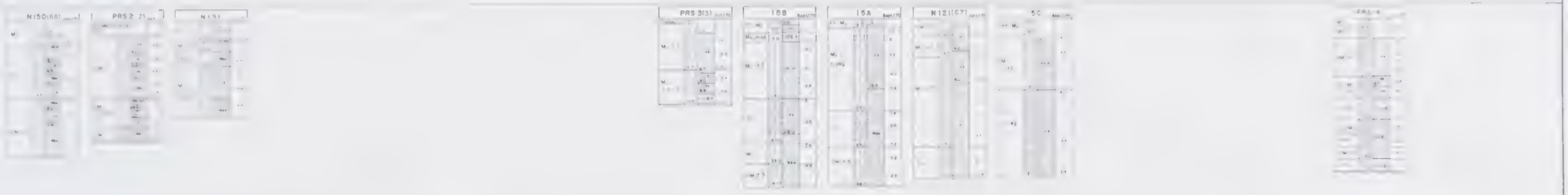


TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

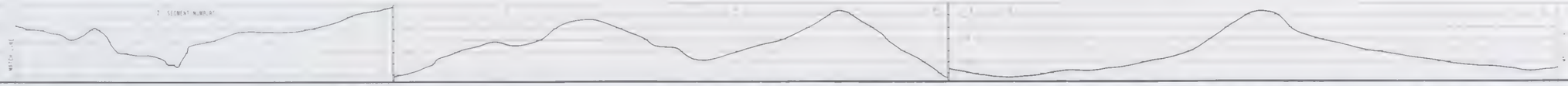
1D-0200-1003

OWNERSHIP

DRILL HOLE DATA



PROFILE



CONSTRUCTION DATA

REFERENCE NOTES & NOTES

MATCH LINE

FOOTAGE THIS SHEET

MATCH LINE

J T M GRID ZONE 7

SCALE 1:25

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- MEASURING STATION
- SIDE VALVE
- COMPRESSOR STATION
- CAMP SITE
- STAGING AREA & CAMP SITE
- WORKSHOP
- DWARF

PIPE DATA

		QUAN
AMPLIFIER 48	WALL 0.250" WT GRADE X70	
HEAVYWALL 48	WALL 1.034" WT GRADE X65	

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN NO

SUBSIDENCE AND EROSION CONTROL LEGEND

B 0 No Subsidence

B 1 Partially buried [illegible] segment

B 2 Fully buried [illegible] segment

B 3 Exposed [illegible]

EC 1 Average slope along segment less than 3° Erodible

EC 2 Average slope along segment greater than 3° Erodible

EC 3 Average slope along segment [illegible]

EC 4 Average slope along segment [illegible]

EC 5 [illegible] along segment

EC 6 Special measures required at steep slopes

EC 7 Control measures required at steep slopes

EC 8 [illegible] Measures to minimize water drainage

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEE DWG 4-0200-1001 FOR MEANINGS USED FOR SOIL DESCRIPT ON ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 6 0 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs

CONTRACT NO. LICENCE Nº

MIN TEST PRESSURE 2100 psi

MAX OPERATING PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES, DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. DOWNSTREAM M.P.

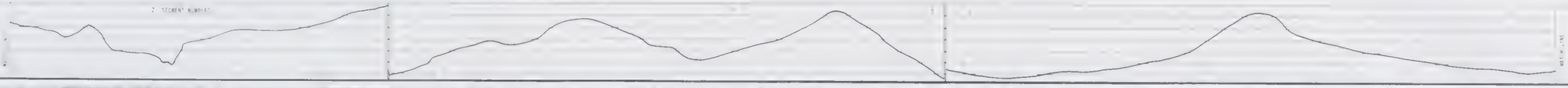
APPROVED	Mar 3/78	SCALE 1" = 1000'
		SHEET 4 OF 14

ID-0200-1004

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

DRILL HOLE DATA

PROFILE



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

1D-0200-004

OWNERSHIP

DRILL HOLE DATA

N103

PROFILE

SEGMENT NUMBERS

MATCH LINE

MATCH LINE

MATCH LINE

U T M GRID ZONE

SCALE

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- S-H STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF

PIPE SPECIFICATION	WT/KM
CARRIER - 48" OD x 0.720" WT GRADE TO	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	
COATING DATA	

QUAN	DESCRIPTION	REQN No

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No buoyancy

B 1 Potential buoyant conditions along segment

B 2 Partially buoyant conditions along portions of the segment

H 6 Hole to river crossing drilling

EC 1 Average slope along segment less than 2° Erodible soil. Control measures required on top slope only

EC 2 Average slope along segment greater than 2° Erodible soil. Control measures required on top slope

EC 3 Average slope along segment less than 2° Non-erodible soil. Bank protection measures may be required

EC 4 Average slope along segment greater than 2° Non-erodible soil. Control measures required on top slope only

EC 5 Erodible water channel. Damage below pipe may be along segment

EC 6 Control measures may be required along pipe

EC 7 [illegible]

EC 8 Landslide deposit or [illegible]. Measures to preserve drainage

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON [illegible] AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

2 SEGMENT MILEPOST EQUALS MATCH LINE M LEPOST PLUS CHAINAGE VALUE.

3 SEE DWG. A 1200-01 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL No	PHOTO Nos
A# 102871-33	173-187

OPERATING LICENCE No

CONSTRUCTION PERMIT No

MIN TEST PRESSURE	2100 psi
MAX OPERATING PRESSURE	1680 psi

No	DATE	REVISION	APPD BY	APPD BY

NORTHERN Engineering Services Company Limited

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA

ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

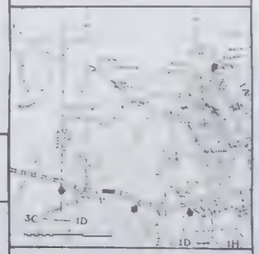
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

DRAWN BY	DATE	
CHECK BY		
APPROVED BY		SHEET 5 OF 14

1D-0200-1005



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

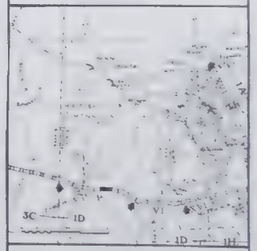
DRILL HOLE DATA

N103

PROFILE

"CEMENT NUMBER"

TERRAIN TYPES



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

D-0200-1005

OWNERSHIP

DRILL HOLE DATA

PROFILE

SEGMENT NUMBERS

CONSTRUCTION DATA

MATCH LINE TOWNSHIP

MATCH LINE NE

MATCH LINE NE

MATCH LINE NE

FOOTAGE THIS SHEET

PIPELINE LEGEND

- PIPELINE
- ABANDONED
- MAINLINE VALVE
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- BRIDGE
- TEMPORARY ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA — QUAN.

HEAVYWALL - 48.00 x .034" WT GRADE 65

COATING DATA

MAINLINE WATER

BASIC FIELD NOTES

B 1 - Muskeg
B 2 - Potential support conditions along segment
B 3 - Potential support conditions along portions of the segment
M & Refer to river crossing drawing
EC 1 - Average slope along segment less than 1° Erodible soil - Slope length control required
EC 2 - Average slope along segment greater than 1° Erodible soil - Slope length control required
EC 3 - Average slope along segment less than 1° Non erodible soil - Minimal control measures required
EC 4 - Average slope along segment greater than 1° Non erodible soil - Minimal control measures required
EC 5 - Erodible soil - Slope length control required
EC 6 - Erodible soil - Minimal control measures required
EC 7 - Erodible soil - Slope length control required
EC 8 - Erodible soil - Minimal control measures required
EC 9 - Erodible soil - Slope length control required
EC 10 - Erodible soil - Minimal control measures required
EC 11 - Erodible soil - Slope length control required
EC 12 - Erodible soil - Minimal control measures required
EC 13 - Erodible soil - Slope length control required
EC 14 - Erodible soil - Minimal control measures required
EC 15 - Erodible soil - Slope length control required
EC 16 - Erodible soil - Minimal control measures required
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EC 39 - Erodible soil - Slope length control required
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EC 41 - Erodible soil - Slope length control required
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EC 51 - Erodible soil - Slope length control required
EC 52 - Erodible soil - Minimal control measures required
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EC 63 - Erodible soil - Slope length control required
EC 64 - Erodible soil - Minimal control measures required
EC 65 - Erodible soil - Slope length control required
EC 66 - Erodible soil - Minimal control measures required
EC 67 - Erodible soil - Slope length control required
EC 68 - Erodible soil - Minimal control measures required
EC 69 - Erodible soil - Slope length control required
EC 70 - Erodible soil - Minimal control measures required
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EC 88 - Erodible soil - Minimal control measures required
EC 89 - Erodible soil - Slope length control required
EC 90 - Erodible soil - Minimal control measures required
EC 91 - Erodible soil - Slope length control required
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EC 94 - Erodible soil - Minimal control measures required
EC 95 - Erodible soil - Slope length control required
EC 96 - Erodible soil - Minimal control measures required
EC 97 - Erodible soil - Slope length control required
EC 98 - Erodible soil - Minimal control measures required
EC 99 - Erodible soil - Slope length control required
EC 100 - Erodible soil - Minimal control measures required

NOTES

1. ALL DIMENSIONS, ELEVATIONS AND DRILL HOLE DATA AS INDICATED ON THIS DWG. CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. A-0001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.0 FEET

ROLL Nº	PHOTO Nº
CR 7075 6	55-59
NR 102871 32	152-157

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE

MAX OPERATING PRESSURE 1680 psig

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA

ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

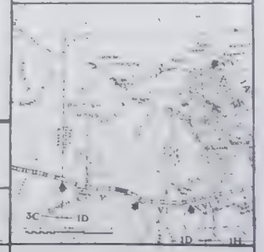
NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. 359 DOWNSTREAM M.P.

SCALE 1" = 2000'

SHEET 6 OF 14

1D-0200-1006



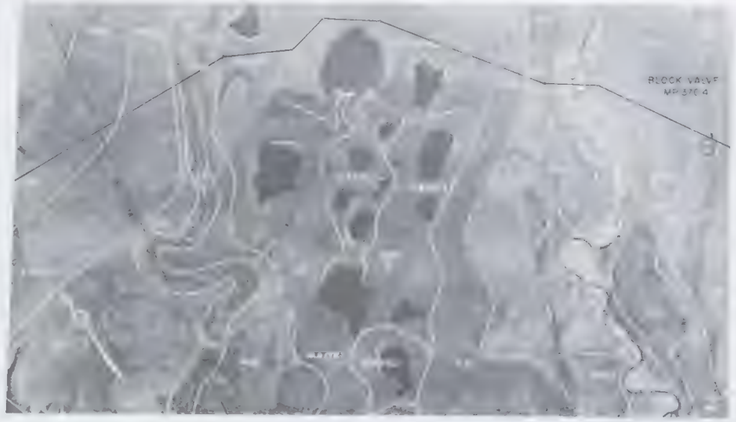
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

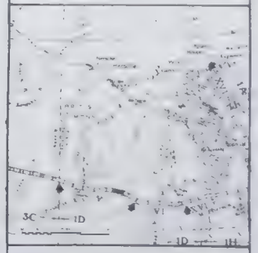
OWNERSHIP

DRILL HOLE DATA

PROFILE

SEGMENT NUMBERS



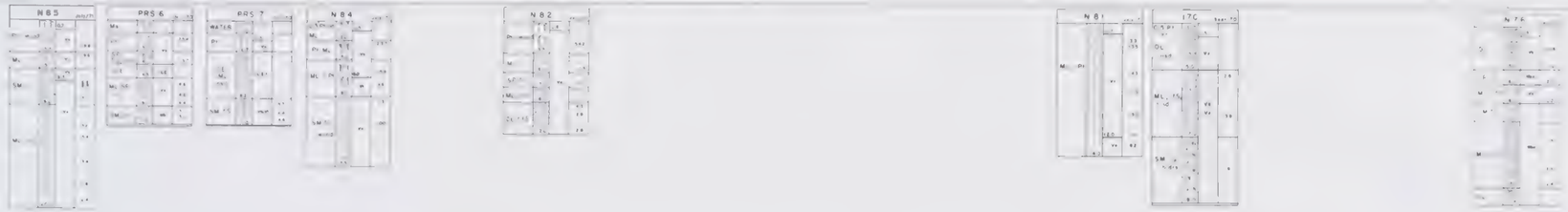


TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

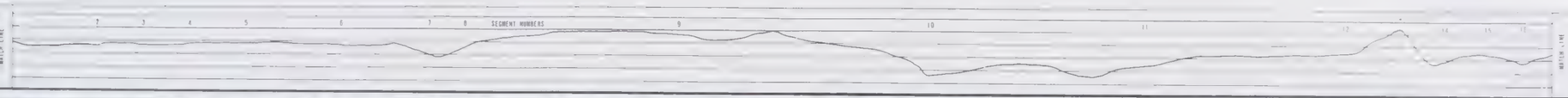
[illegible]-0200-006

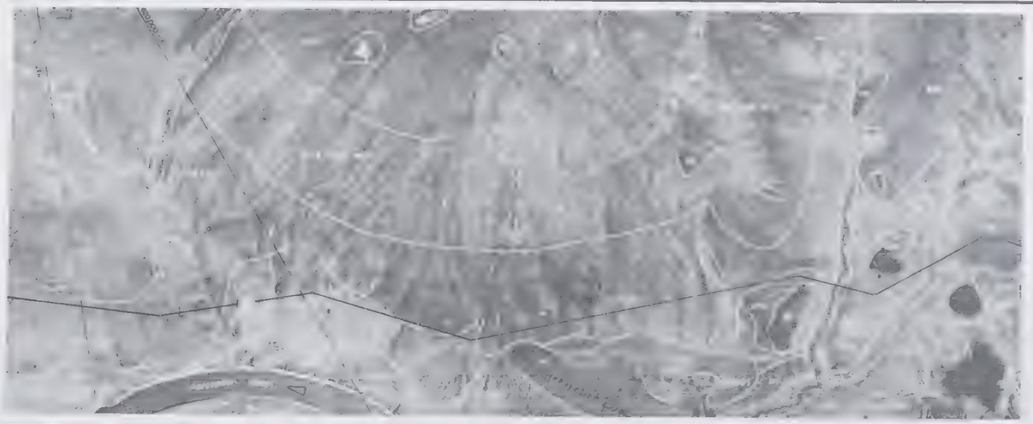
OWNERSHIP

DRILL HOLE DATA



PROFILE





TERRAIN TYPING LEGEND

[illegible]

Surficial Features

SYB Eroding valley banks; mostly erosion in stratified silt and fine sand, but locally bedrock or gravel
POL Former oriented lakes, surficial peats and organic silt layers over fine-grained deposits
CVP Ice-wedge polygons, dominantly silt in subsurface
SOT Solifluction terraces and sheets; usually thin coarse boulder debris over bedrock
OSF Old slope failures, usually at actively or formerly undercut slopes composed of fine-grained materials
RB Raised beaches, silt, sand, and gravel
TK Thermokarst lakes and ponds, ice-rich fine-grained [illegible]

Depth phases of ice-rich silty topstratum

d 5 to 10 ft of ice-rich silty topstratum with peaty [illegible]
S1 up to 10 ft of ice-rich colluvial/slopewash, fine [illegible]

[illegible]

PT Unbatterned peatland, peat generally less than 5 ft thick
SB String bog, ribbed and reticulated fens, peat generally less than 5 ft thick

CONSTRUCTION DATA

REFERENCE POINTS	MAINLINE	VISION DATA	SEGMENT NO	SEGMENT LENGTH	EROSION CONTROL	BUOY	REVEG
MATCH LINE 370 [illegible]	00 00		1				
	0 02		2	2N	EC-1C	B-0	I-Y-2
	1.01		3	0 37	EC-1C	B-1	
	1.38		4	0 43	EC-8	B-1	
	1.81		5	[illegible]	EC-8	B-1	
	2.14		6	1.03	EC-1D	B-1	I-Y-3
	3.17	4-0210-1059		0 32	EC-1C	B-0	I-Y-2
	3.49			0 18	N A	B-0	
	3.67				N A		
	6.28	MATCH LINE	9	2 01	EC-1C	B-0	I-Y-2
	6.28	MATCH LINE	9	0 80	EC-1C	B-0	
	6 88	4-0210-1090	10	0.37	N A	B-0	
	7.25			7 88	EC-1B	B-0	I-Y-2
	0 23	4 0210 1090		0 09	EC-8	B-1	
	0 32			0.63	EC-2C	B-0	
	10 95			0 08	N A	N A	I-Y-6
	11 03			0 52	EC-1C	B 0	I-Y-2
	11.15			0 13	EC-8	B-1	
	11 88			0 15	EC-1C	B 0	
	11 93	MATCH LINE 387.73					

FOOTAGE THIS SHEET

U T M GRID ZONE 7

SCALE miles

PIPELINE LEGEND

- CARRIER PIPE (above ground)
- CARRIER PIPE (below ground)
- BENCH BREAK
- SWAMP METHANE
- [illegible]
- FROST ANCHOR
- [illegible]
- [illegible]
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF SHIFT
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST NON AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- BEARING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA

	QUAN
CARRIER 48"OD x 0.720"WT GRADE 70	
HEAVYWALL - 48"OD x 1.034"WT GRADE 88	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQ'N NO

BANKCAT AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
B/R Buoy to river crossing dimming
EC Average slope along segment less than 3° Erosion control measures are not required or are [illegible]
EC-1 Average slope along segment greater than 3° Erosion control measures required
EC-1 Average slope along segment less than 3° Non-erosion [illegible] control measures required
EC-2 Average slope along segment greater than 3° Non-erosion [illegible] control measures required
EC-3 Average slope along segment greater than 3° Non-erosion [illegible] control measures required
EC-5 Unstable water course Design [illegible] required along segment
EC-6 Control measures required along [illegible]
EC-7 Control measures required along [illegible]
EC-8 Low lying ground [illegible] Design [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG # 0200 CV1 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
CR 1073	1 - 8
CR 1075	59 63

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 2100 psi

MAX OPERATING PRESSURE 680 psi

Nº	DATE	REVISION	APPD	APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

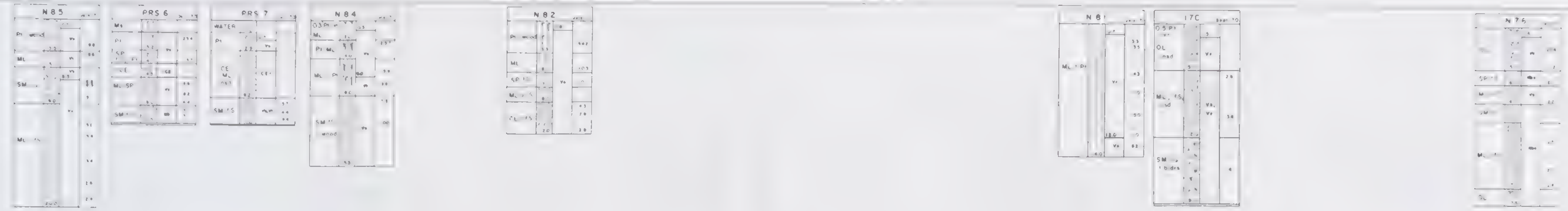
UPSTREAM M.P. DOWNSTREAM M.P.

DRN BY DATE
CHK BY
APPD BY DATE
SCALE 1:1000
SHEET 7 of 4
1D-0200-1007

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA



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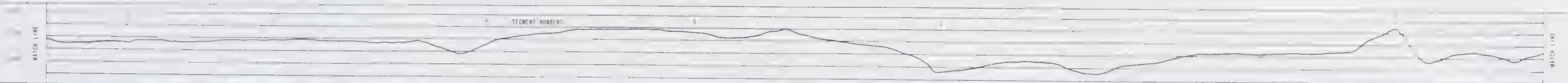


TERRAIN TYPING LEGEND

V -- OLD CROW BASIN PHYSIOGRAPHIC DIVISION

Alaska/Yukon Border to Berry Creek west of Richardson Mountains

TERRAIN TYPES

Active flood plain exposed sand and/or gravel

[illegible]

[illegible]

Ar alluvial fans [illegible]

Fossil [illegible] silt and [illegible] generally less [illegible] silty and [illegible]

Glacial lake basin stratified ice-rich [illegible] silt, and silty clay lacustrine deposits, generally thinnest over bedrock on steeper slopes showing RB and SL and thickest in TK and FOL areas, occurs [illegible]

[illegible] terraces composed of stratified ice-rich fine sand and silt with some coarser sand and [illegible]

[illegible] than 5 ft) to locally [illegible] rock fragments and silt [illegible] felsenmeer and solifluction debris, boulders decrease in size and proportion downslope from bedrock outcrops, the upslope boundary intergrades with BR and the downslope boundary intergrades with RSR, frequent inclusions of thick excess ice

[illegible]

[illegible]

Surface features

[illegible]

5 to 10 ft of ice-rich silty lacustrine with peaty layers over sand and/or gravel

up to 10 ft of ice-rich colluvial slopewash, fine sand and silt with peaty layers over [illegible]

Organic land phases

FT Unpatterned peatland, peat generally less than 5 ft thick

SB String bog, ribbed and reticulated fens, peat generally less than 5 ft thick

TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

1D-0200-1007

DRILL HOLE DATA

N68165

8C

8B

PROFILE

MP 380

Porcupine River

CONSTRUCTION DATA

REFERENCE DRAWING & NOTES

MILEAGE

DITCH LINE NO. 4

FOOTAGE THIS SHEET

SCALE (MILES)

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- RELIEF
- MAINLINE STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- CAMP SITE
- STAGING AREA & CAMP SITE

PIPE DATA

	QUAN
CARRIER - 48.0 O.D. x 0.720" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN NO

BUOYANCY AND EROSION CONTROL LEGEND

B 0 No Buoyancy

B 1 Potential buoyant conditions along segment

B 2 Potential buoyant conditions along portions of the segment

B 4 Refer to river crossing drawing

EC 1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only

EC 2 Average slope along segment greater than 3° Erodible soil. Cross spread control measures required

EC 3 Average slope along segment less than 3° Non erodible soil. Minimal control measures required

EC 4 Average slope along segment greater than 3° Non erodible soil. Control measures required

EC 5 Side slopes greater than 30° Non erodible soil. Control measures required

EC 6 Side slopes greater than 30° Erodible soil. Control measures required

EC 7 Side slopes greater than 30° Non erodible soil. Control measures required on steep sideslopes

EC 8 Side slopes greater than 30° Erodible soil. Control measures required on steep sideslopes

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG. # 0200-001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nº
CA 7081	135

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE 2100 psi

MAX. OPERATING PRESSURE 1680 psi

Nº	DATE	REVISION	APPD	APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. 0 DOWNSTREAM M.P.

DRAWN Jan 14/74

APPD. SCALE 1:2000

SHEET 8 OF 14

1D-0200-1008

TERRAIN MAPPING BY

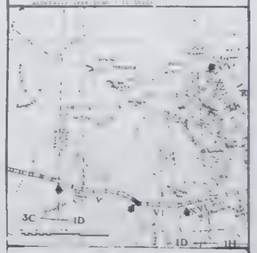
J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

3C 1D VI 1H

DRILL HOLE DATA

PROFILE



D 0200-208

J.D. MOLLARD & ASSOCIATES LIMITED

OWNERSHIP

DRILL HOLE DATA

PROFILE

CONTRACT NO. 0.2

EPINET FARM NO.

LANDUSE

DESIGN DATA

SEGMENT NO.

SEGMENT NO. EROSION CONTROL

BUOY

REVEG.

FOOTAGE THIS SHEET

SCALE 1 mile

PIPELINE LEGEND

- BURIED PIPE
- ABOVEGROUND PIPE
- VALVE
- WATER WEIGHT
- FROST ANCHOR
- SCRIB ANCHOR
- HEAT RAIL PIPE
- CASING PIPE
- ANCHOR BLOCK (GROUND)
- HEAT VALVE
- TEMPORARY ROAD
- TEMPORARY PIPE
- RAILWAY
- MEASURING STATION
- COMMUNICATIONS TOWER
- BUOY VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- BRIDGE

CARRIER: 48" OD x 0.720 WT GRADE 70
HEAVYWALL - 48 OD x 1.034" WT GRADE 65

MATERIAL

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

NOMENCLATURE - SEE FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.

AERIAL PHOTOGRAPHY

NO.	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. — DOWNSTREAM M.P.

9 4

0 2006 - 009

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

N64 N62 N61 N59

PROFILE

TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

1D-0200-1009

OWNERSHIP

DRILL HOLE DATA

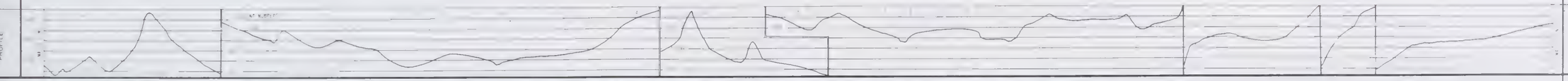
N 54

N 48

N 47(64)

N 44

PROFILE



CONSTRUCTION DATA

PIPELINE CLEARANCE ON PLOT

MATCH LINE

MARKER

MARKER DATA

C.G.S.

BUOY

REVEG.

SCALE - miles

FOREMAN TRACK SHEET

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- COMPRESSOR STATION
- SIDE VALVE
- AIR STRIP
- WINTER TRAIL
- STORAGE OR STAGING AREA
- BORROW SITE

PIPE DATA	QUAN
CARRIER - 48" OD x 0.720" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 85	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REGN No

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
M-A Refer to river crossing drawing
EC-1 Average slope along segment less than 5° Erodible soil. Control measures required in run areas only
EC-2 Average slope along segment greater than 5° Erodible soil. Slope spaced control measures required
EC-3 Average slope along segment less than 5° Non erodible soil. Minimal control measures required
EC-4 Average slope along segment greater than 5° Non-erodible soil. Control measures req. [illegible]
EC-5 [illegible]
EC-6 Control measures req. [illegible] steep sidehill
EC- [illegible]
EC-8 [illegible]

GENERAL NOTES

1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION

2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

3 SEE DWG. # 0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

4 MINIMUM DEPTH OF COVER - 2.5 FEET

AERIAL PHOTOGRAPHS	
ROLL No	PHOTO No
CR 7071	31-33
CR 7081	120-126

OPERATING LICENCE No	
CONSTRUCTION PERMIT No	
MIN TEST PRESSURE	2100 psi
MAX OPERATING PRESSURE	1680 psi

No.	DATE	REVISION	APPD	APPD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. 401 — DOWNSTREAM M.P. 411

	DATE
DRN.	
CHKD. BY	Jan 19/79
APPD. BY	Jan 19/79

SCALE 1" = 1000'
SHEET 10 OF 14

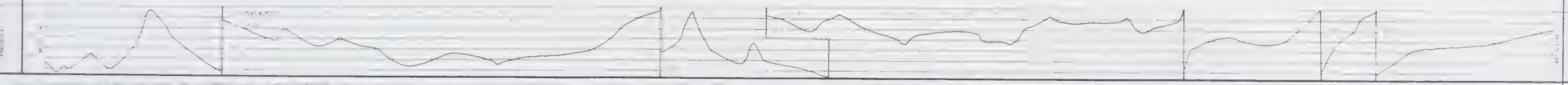
10-0200-1010

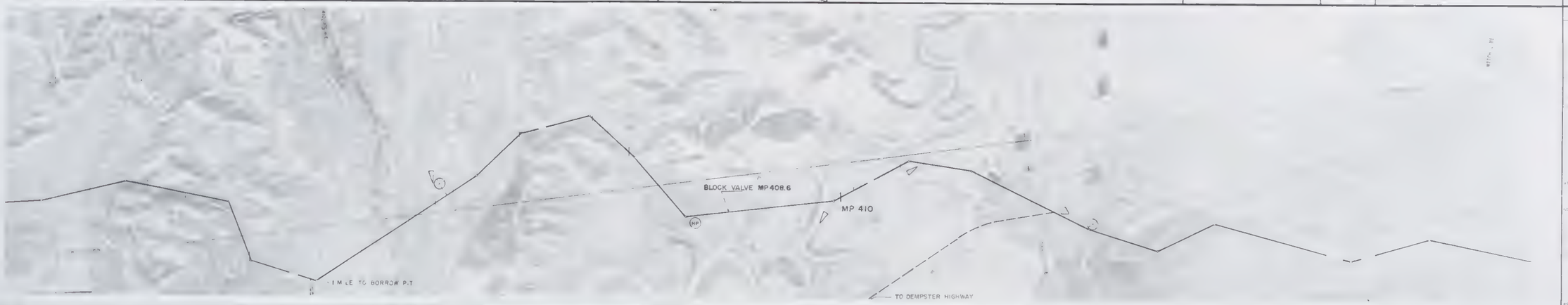
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

ENGINEER





TERRAIN TYPES LEGEND

[illegible]

Fluvial features

[illegible]

Lacustrine features

[illegible]

Peatland features

[illegible]

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

0-0200 010

OWNERSHIP

DRILL HOLE DATA

PROFILE

N43

N4

N40

MP 426

MATCH LINE

MATCH LINE

FOOTAGE THIS SHEET

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- QUARRY
- WINTER TRAIL

PIPE DATA	QUAN
CARRIER 48 OD X 0.620" WT GRADE 70	
HEAVEWALL 48 OD X 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQN NO

BUOYANCY AND EROSION CONTROL LEGEND

- B 0 No buoyancy
- B 1 Patent or buoyant conditions along segment
- B 2 Patent or buoyant conditions along portions of the segment
- B A Rates in river crossing drawing
- EC 1 Average slope along segment less than 3° Erosion control measures required
- EC 2 Average slope along segment greater than 3° Erosion control measures required
- EC 3 Average slope along segment less than 3° Max gradient in 1 Mile less than 6 meters required
- EC 4 Average slope along segment greater than 3° Max gradient in 1 Mile less than 6 meters required
- EC 5 Unstable water course Deeper burial required and segment
- EC 6 Control measures required on steep river bank
- EC 7 Control measures required on steep river
- EC 8 Low lying condition or bog Measures to prevent drainage

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG # 01200-001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

* MINIMUM DEPTH OF COVER - 3.0 FEET

AERIAL PHOTO INDEX	
ROLL Nº	PHOTO Nº
9	1

PERMIT NO. OF PIPELINE Nº	
CONSTRUCTION PERMIT Nº	
MINIMUM PIPELINE PRESSURE	2100 psi
MAX. OPERATING PRESSURE	1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY, ALBERTA

ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. ____ DOWNSTREAM M.P. ____

		1D - 0200 - 1011

3C - 1D

1D - 1H

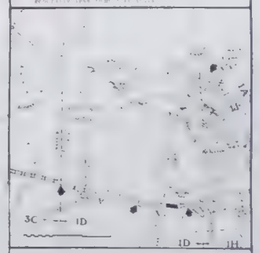
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED

OWNERSHIP

DRILL HOLE DATA

N43 N41 N40 N38 20D 20E

PROFILE



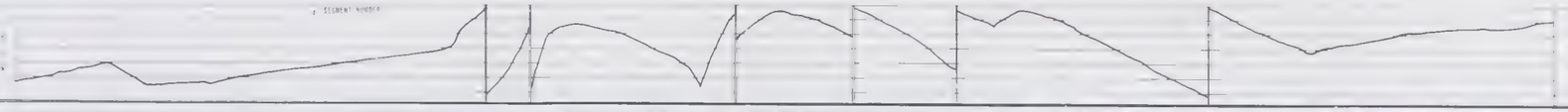
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

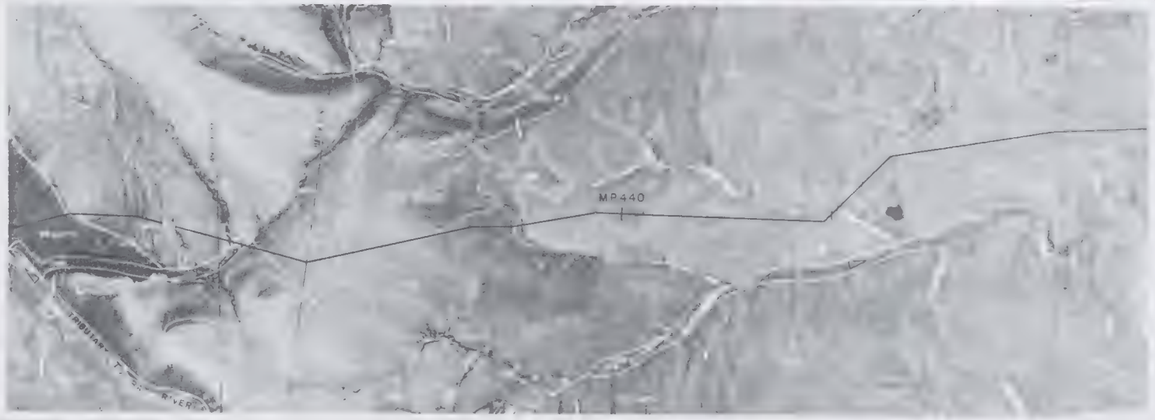
1D-0200-1011

OWNERSHIP

DRILL HOLE DATA

PROFILE





MATCHLINE (SEGMENT NO.)

MATCH LINE

MATCH LINE

MATCH LINE

FOOTAGE THIS SHEET

SCALE (miles)

PIPELINE LEGEND

- CARRIER PIPE (SIZE GRADE)
- CASING PIPE (SIZE GRADE)
- POST OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN
- AIRCRAFT
- HEIGHT OF ELEVATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- POINT OF INTERSECTION
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- PERMANENT ROAD

PIPE DATA

	QUAN
CARRIER: 48 OD x 0.720 WT x GRADE 70	
HEAVYWALL: 48" OD x 1.034" WT GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQN No

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- P-A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil Control measures required on non arable only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non erodible soil Normal control measures required
- EC-4 Average slope along segment greater than 3° Non erodible soil Close spaced control measures required
- EC-5 Unstable water course Gopher burrow observed along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required on steep sideslopes
- EC-8 [illegible]

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG # 0200-100F FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

ROLL No	PHOTO No	DATE
CR7031	84	[illegible]
NW-0287	66-117	[illegible]
NB69172	[illegible]	[illegible]

OPERATING LICENCE No

CONSTRUCTION PERMIT No

MIN TEST PRESSURE

MAX [illegible] 1680 psi

No	DATE	REVISION	APPRD	CHKD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY, ALBERTA

ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES - DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. [illegible] DOWNSTREAM M.P. [illegible]

DRAWN [illegible] DATE [illegible]

APPRD [illegible] DATE [illegible]

SHEET 12 OF 14

10-0200-1002

TERRAIN MAPPING BY
J.D. MELLARD & ASSOCIATES LTD.
REGINA, SASK.

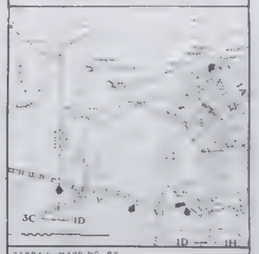
3C — 1D

1D — 1H

OWNERSHIP

DRILL HOLE DATA

PROFILE

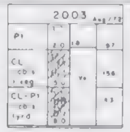


TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

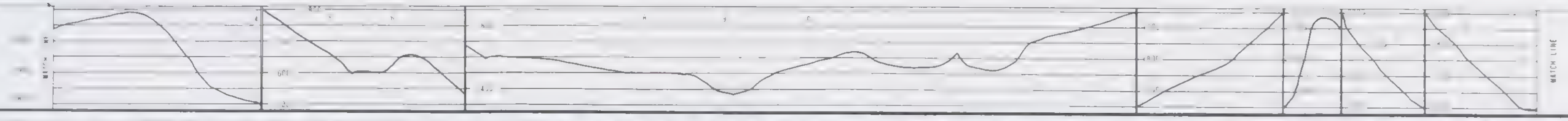
1D-0200-1012

OWNERSHIP

DRILL HOLE DATA



PROFILE



CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	MATCH LINE 443 03							4 0210 1099		MATCH LINE	MATCH LINE	4 0210 1099	MATCH LINE
CHAINAGE		0.73	1.02		1.78 1.65		3.47	0	.43	4.3	1.01		
SEGMENT Nº		1	2	3	4	5	6	7	8	9	10	10	11
SEGMENT LENGTH		0.73	0.08	0.23	0.74	0.09	0.82	0.60	0.76	0.26	0.92	1.49	0.58
EROSION CONTROL		[illegible]	[illegible]	EC 8	EC-IC	N A	EC-IC	N A	EC IC	N A	[illegible]	[illegible]	N A
BUOY		[illegible]	B	B	B 0	N A	B-2	N A	B 0	N A	B 0	B	N A
REVEG		I V 2						I-V 6	I V 2	I V 6	I V 2	I-V-2	I-V 6

FOOTAGE THIS SHEET

U T M GRID ZONE 8

0 0.5 1.0
SCALE (miles)

PIPELINE LEGEND

POINT OF INTERSECTION
DRILL HOLE LOCATION
WARNING SIGN
MILEPOST SIGN AIRCRAFT
CHAINAGE EQUATION
COMPRESSOR STATION
A.A. STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
WHARF
PERMANENT ROAD
TEMPORARY ROAD
HELIPAD
MEASURING STATION
COMMUNICATIONS TOWER
SIDE VALVE
WINTER TRAIL

PIPE DATA	QUAN
CARRIER - 48" O.D. x 0.720" W.T. GRADE 70	
HEAVY WALL - 48" O.D. x 1.084" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQ'N Nº

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
N/A Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2 Average slope along segment greater than 3° Erodible soil. Control measures required
EC-3 Average slope along segment less than 3° Non erodible soil. Control measures as required
EC-4 Average slope along segment greater than 3° Non erodible soil. Control measures required in low areas only
EC-5 Unstable water course. Deeper burial required along segment
EC-6 Control measures required on steep sideslopes
EC-7 Control measures required at steep scarps
EC-8 Low lying area [illegible]

GENERAL NOTES
1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION
2 SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3 SEE DWG. 4 0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS
4 MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
NWB9772	130 133
NWB4872	36-41
NWB4872	44 47

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 2100 psi
MAX OPERATING PRESSURE 680 psi

Nº	DATE	REVISION	APPRO BY	APPRO BY

NORTHERN ENGINEERING SERVICES
COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY
UPSTREAM M.P. 44
DOWNSTREAM M.P.

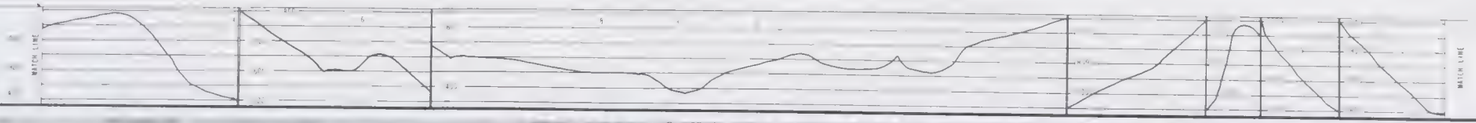
DATE
Jan 4 7
SCALE 1 2000
SHEET 13 OF 14
1D-0200-1013

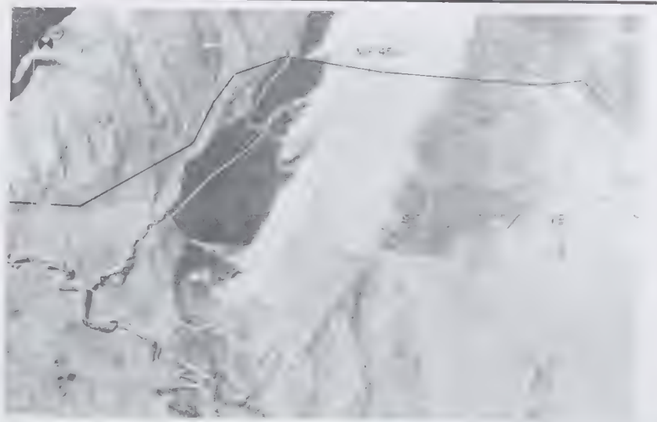
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK

OWNERSHIP

DRILL HOLE DATA

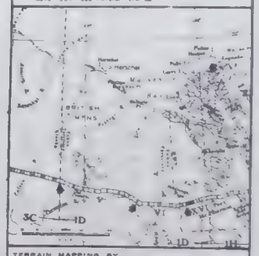
PROFILE





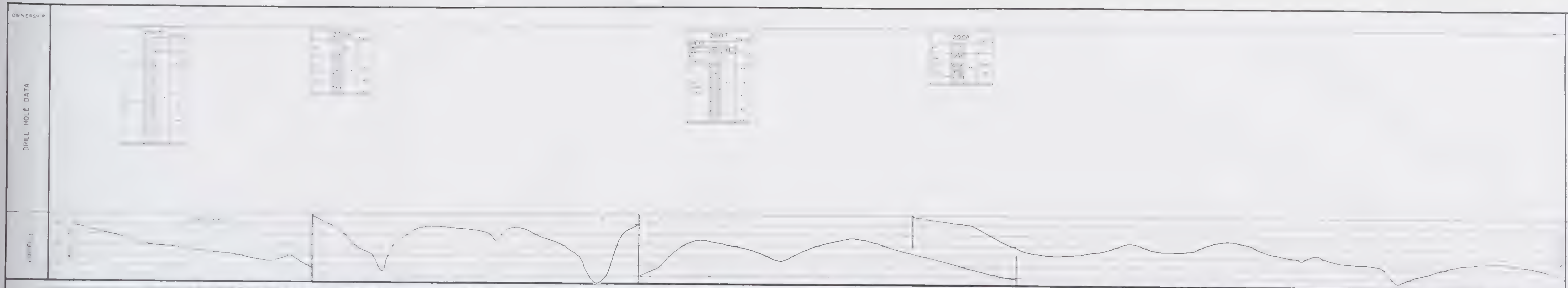
TERRAIN - TYPING LEGEND

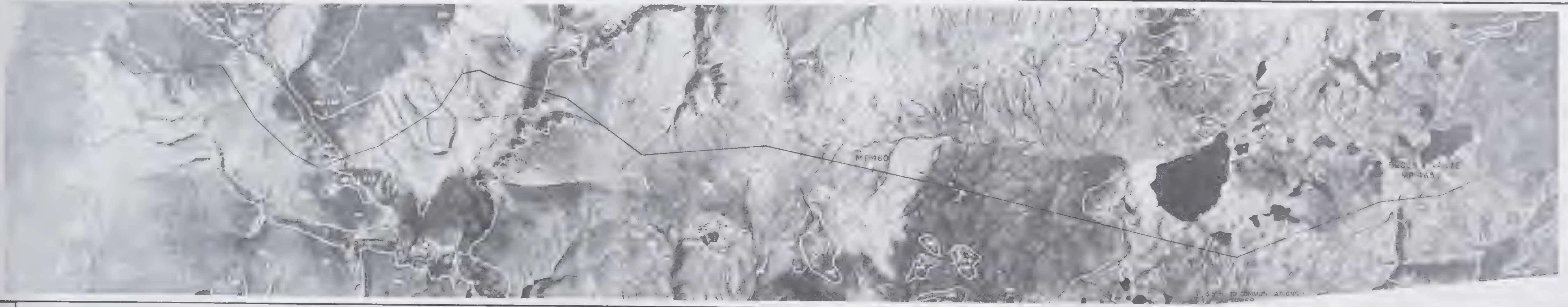
NOTE LST - SEE PHYSIO. DPL. 3E



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

1D-0200-1013





FOOTAGE THIS SHEET

PIPELINE LEGEND

- POINT OF INTERSECTION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- ▲ CAMP SITE
- ○ STAGING AREA & CAMP SITE
- BORROW SITE
- ■ WHARF
- PERMANENT ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN
HEAVYWALL - 48" OD x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REQN Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B 0 No buoyancy
- B 2 Potential buoyant conditions along portions of the segment
- N A Refer to river crossing drawing
- EC 1 Average slope along segment less than 3°
- EC 2 Average slope along segment greater than 3° Erodible soil. Close spaced control measures required

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG 4-0703-103 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER 2.5 FEET.

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
NW 8387	48 66

CONSTRUCTION PERMIT Nº

MAX. OPERATING PRESSURE 68

NORTHERN Engineering Services Company Limited

NORTHERN ENGINEERING SERVICES
COMPANY LIMITED
CALGARY ALTA.
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

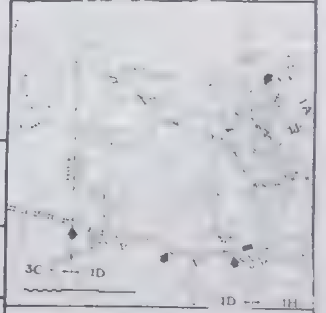
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P.

DOWNSTREAM M.P.

4 4

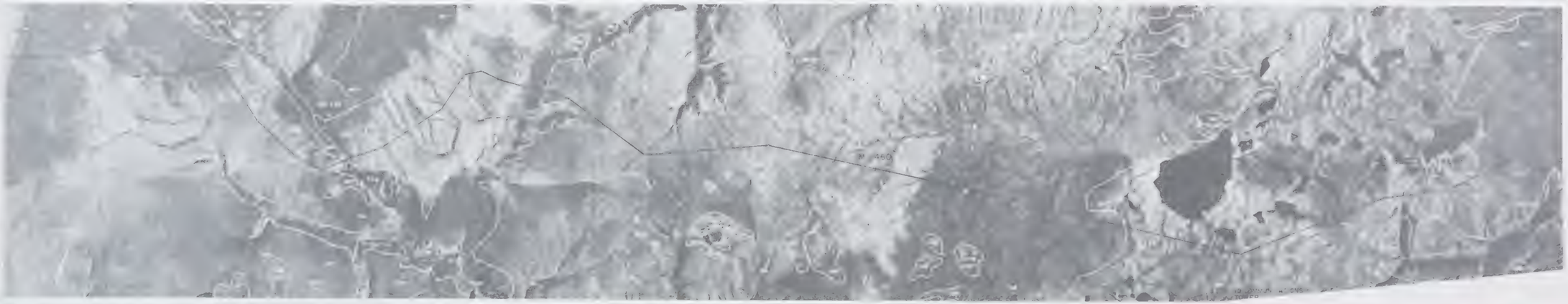


TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



"Unnamed" names tributary to Stony Creek - some risky points in grey zone - avoid this.
Expect no winter flows. Caution will be needed in winter crossing - 2 to avoid it.

Stony Creek near its flat associated with lower terraces, [illegible]

[illegible] Cottongrass tussock on hilltops grading into dwarf birch and heavier heath on slopes. These communities are frequently dissected by streams, depressions, [illegible] scattered black spruce and depression of cottongrass heath.

Jack pine popular and white spruce with [illegible] on river terraces. Alder and willow in riparian [illegible]

A [illegible] of [illegible] with [illegible] on both sides, streams [illegible] by [illegible] [illegible]

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

1D-0200-1014

OWNERSHIP

DRILL HOLE DATA

2009-99 Aug/72 — Pt; ML-CL, 1 G, 1 S, 1 vvg

2011(1001) Aug/72 — Pt; CL ML, S, trvd; ML, 1 vvg

2012 Aug/72 — Pt; OH; S.S.; CL-CH, 1 S

H72-105(104) Jul/72 — SC, 1 S, 1 vvg; SHALE

2013 Aug/72 — CL; SM, 1 S; CL, 4 S; SP, 1 S

2014 Aug/72 — CL; Pt, wood; CL, S, 1 G, 1 vvg; ML

H72-106 Jul/72 — ML, MH, 1 S, 1 vvg; 27.0

H72-107 Jul/72 — CL, 1 G, 1 S, 1 vvg

H72-108 (05) Jul/72 — ML

PROFILE

MATCH LINE

TERRAIN TYPING LEGEND

REFERENCE DRAWING & NOTES	MATCH LINE 465 74																												MATCH LINE 478 75
CHAINAGE (KM)	30 65		2.21	2.46	2.5		3.95	4.17	5.02		6.51		7.25	7.71	7.38	8.03	8.33	8.53	8.86	9.7	9.45	10.21	10.31		11.18		12.13		12.31
DESIGN DATA																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	1.25	0.52	0.33	1.2	1.4	0.22	0.85	1.3	4	0.6	0.15	0.21	0.76	0.20	0.33	0.31	0.22	0.41	0	0.52	1.64	0.78
	EC 1C	EC 20	EC 10	EC 20 EL 7	EC 10	EC 20	EC 10	EC 1C EC 7	EC 1C	EC 1C	EC 1C	EF 9	EC C	EC C	EC C	EC 1C	EL C	EC D	N A	EC 10	N A	EC C
	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 1	8 0	8	8 0	8 1	8 0	8	8 0	8 1	8 0	8 1	N A	8 1	N A	8 1
	1 x 1				1 x 2			1 x 7 1 x 6		1 x 2											N A	1 x 2

FOOTAGE THIS SHEET

J T M GRID ZONE 8

SCALE (miles) 0 0.5 1.0

PIPELINE LEGEND

- PIPELINE ALIGNMENT
- PIPELINE ALIGNMENT (ALTERNATE)
- MAINLINE VALVE
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WORKING TRAIL
- STORAGE OR WORK AREA
- CAMP SITE
- CROSSING OF A RIVER
- BORROW
- QUARRY

PIPE DATA	QUAN
CARRIER - 48" OD x 0.720" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	BEON NO

BUOYANCY AND EROSION CONTROL LEGEND

E 0 No buoyancy

B 1 Potential buoyant conditions along segment

B 2 Potential buoyant conditions along portions of the segment

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. THE CONTRACTORS RESPONSIBILITY TO ASSUME HIMSELF OF THIS INFORMATION

2. SEE DWG. # 0200-001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

3. M.W.M. = DEPTH OF COVER = 2.8 FEET

AERIAL PHOTOGRAPHY

ROLL No | PHOTO No

PERMIT No | LICENCE No

CONSTRUCTION PERMIT No

MIN TEST PRESSURE 2100 psi

MAX OPERATING PRESSURE 1680 psi

No	DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES (EAST OF MACKENZIE & YUKON TERRITORY)

UPSTREAM M.P. 466 — DOWNSTREAM M.P. 4

DRN BY | DATE

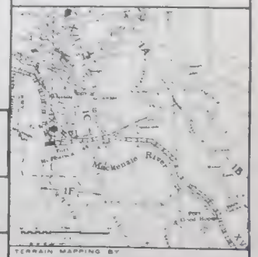
CHKD BY | DATE

APPD BY | DATE

SCALE 1" = 1000'

SHEET 1 OF 6

IF-0200-1001

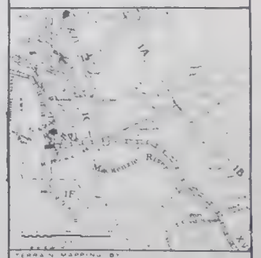


TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

IF-0200-1001

OWNERSHIP

DRILL HOLE DATA

PROFILE

INTERPRETATION DATA

MATCH LINE

FOOTAGE THIS SHEET

U T M GRID ZONE 8

SCALE (miles)

PIPELINE LEGEND

PERMANENT ROAD
TEMPORARY ROAD
MEASURING STATION
COMMUNICATIONS TOWER
SIDE VALVE
WINTER TRAIL
COMPRESSOR STATION
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE

PIPE DATA	WORK
CARRIER - 48" O.D x 0.720" W.T. GRADE 70	
HEAVYWALL - 48" O.D x 1.034" W.T. GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	BEGIN MP

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant condition along segment
B-2 Potential buoyant condition along portions of the segment
W/A Refer to "as" cross sig drawing
EC Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-1 Average slope along segment greater than 3° Erodible soil. Erosion control measures required
EC-2 Average slope along segment less than 3° Non erodible soil. Control measures required
EC-3 Average slope along segment greater than 3° Non erodible soil. Control measures required in low areas only
EC-4 [illegible] slopes
EC-5 Control measures required on steep sideslopes
EC-6 [illegible]
EC-7 [illegible]

GENERAL NOTES:
1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST (DOUBLE) MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG. A-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.0 FEET

AERIAL PHOTOGRAPHS

ROLL Nº	PHOTO Nºs
NW 69772	81-88
NW 70772	135-135

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 2000 psi
MAX OPERATING PRESSURE 1680 psi

1		APR 3	APR 3
2			
3			

NORTHERN ENGINEERING SERVICES (CANADA) LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. 178 DOWNSTREAM M.P. 180

DRN BY	DATE
CHK BY	DATE
APPR BY	DATE

F-0200-1002

J D MOLLARD & ASSOCIATES LIMITED
REGINA SASK

DRILL HOLE DATA

PROFILE

ENVIRONMENTAL DATA AND PROTECTION MEASURES

Dense shrub corridor lines of willow and alder with scattered black spruce and some paper birch. Understory of dwarf birch, heath and moss. Depressions have more sedge and moss.

Dense mature and immature black spruce with heavy understory of willow and feathermoss. The forest has sedge and sphagnum moss scattered throughout.

1F-0200-1002

J. D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

DRILL HOLE DATA

PROFILE

CONSTRUCTION DATA

FOOTAGE THIS SHEET

U T M GRID ZONE 8

SCALE (miles)

PIPELINE LEGEND

PERMANENT ROAD
TEMPORARY ROAD
WEATHERING STATION
COMMUNICATIONS TOWER
SIDE VALVE
WATER LINE
COMPRESSOR STATION
CAMP
STORAGE OR STAGING AREA
STAGING AREA & CAMP
AIRSTRIP
BRIDGE

CARRIER - 48" OD x 0.720" WT GRADE 70
HEAVYWALL - 48" OD x 1.034" WT GRADE 65

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.

SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

* MINIMUM DEPTH OF COVER - 3.0 FEET

TERRAIN PHOTOGRAPHS

ROLL Nº	PHOTO Nºs
NR70722	57-60
NR70722	28-32
NR70722	33-35

PERMIT NO. PIPELINE Nº

CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE 2000 psi

MAX. PERMITTED PRESSURE 1680 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

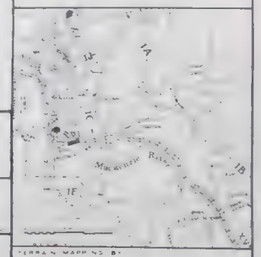
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. DOWNSTREAM M.P.

SCALE 1:20000

SHT. 3 OF 6

1F-0200-1003



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

DRILL HOLE DATA

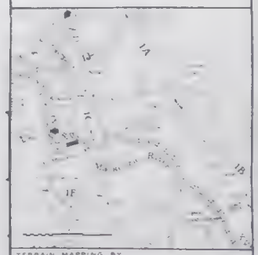
PROFILE

Low productively upland forest of habitat 1.
Potential wood and caribou winter range unit
[illegible] noise area

Open black spruce and tamarack with some paper birch. Understory varies but is mostly labrador tea, Canadian yew and sphagnum. Ribbed moss from heavy [illegible] cover

Open black spruce and tamarack with a dense shrub cover

Open black spruce and tamarack with an understory of labrador tea [illegible]



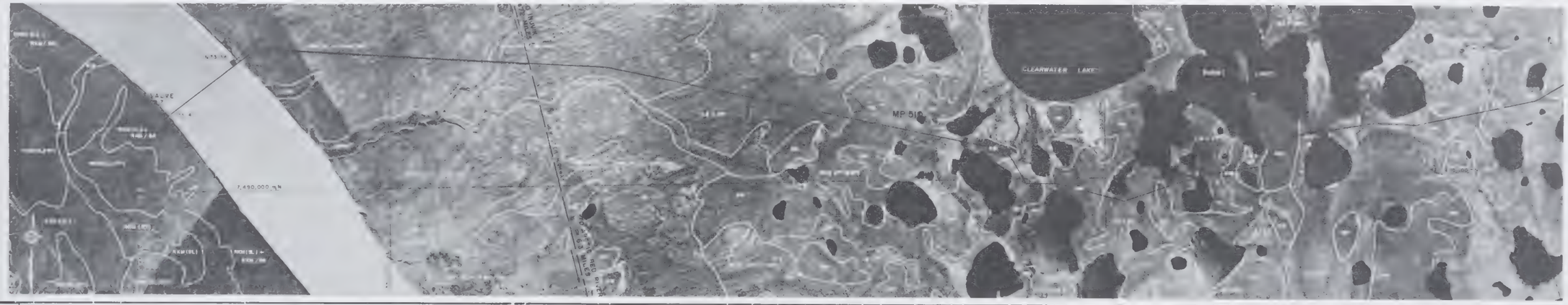
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

IF-0200-1003

OWNERSHIP

DRILL HOLE DATA

PROFILE



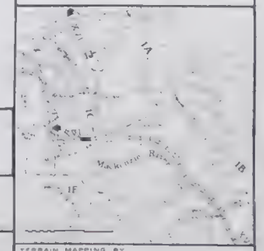
CONSTRUCTION DATA

MISCELLANEOUS MATERIAL

WELDING LINE

DESIGN DATA

SCALE - miles



PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL
- COMPRESSOR STATION
- GAS STATION
- STORAGE OR STAGING AREA
- BORROW SITE

PIPE DATA	QUAN
CARRIER - 48" OD x 0.720" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN	DESCRIPTION	REMARKS

BUOYANCY AND EROSION CONTROL LEGEND

GENERAL NOTES

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3. SEE DWG # 0200-1001
4. MINIMUM DEPTH OF COVER = 3.0 FEET

AERIAL PHOTOGRAPHY

OPERATING LICENCE No

No	DATE	REVISION	TYPE BY	APP BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

NORTHWEST TERRITORIES - DIST OF MACKENZIE - & YUKON TERRITORY

UPSTREAM M.P. 502 DOWNSTREAM M.P.

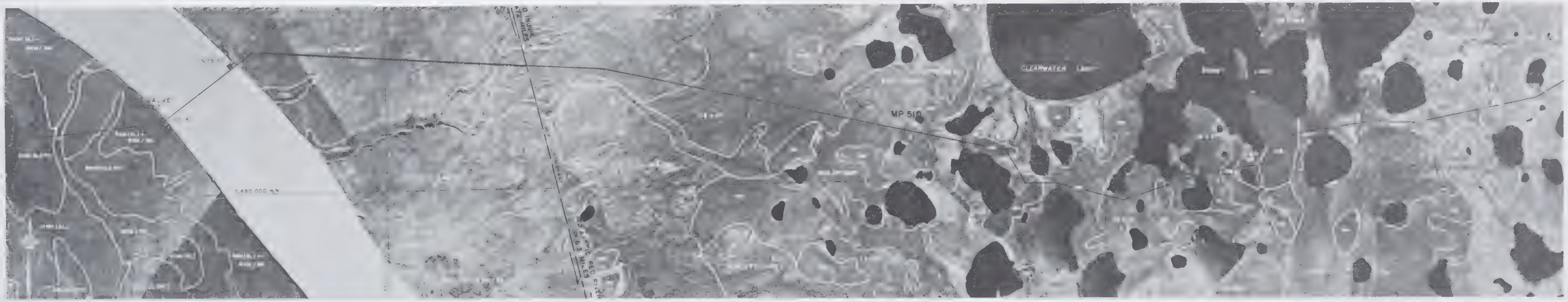
4 6 IF-0200-1004

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



ENVIRONMENTAL DATA AND PROTECTION MEASURES

nd migratory species use area for breeding, highly sensitive from ... avoided.

Lake and Pothole area, habitat widely ...
Low level aircraft flights will be ...

... lynx, red fox, mink or wolverine.

VEGETATION

... dwarf ... scattered ... grass

Shrub cover of alder, dwarf birch, dwarf willow with ...

Scattered sedge and grass meadow with heavy lichen cover and shrub forest of alder, dwarf willow, dwarf birch, alpine blueberry, lingonberry, cloudberry, herbs and mosses.

Cottongrass and shrub hummocks, alternating with cottongrass tussock with herbs, sedge and lichen. Shrubs are alder, dwarf birch and willow. Sphagnum - heath bogs are present.

Cottongrass tussock and hummock with alder, dwarf birch and willow, alpine blueberry, lingonberry and herb cover.

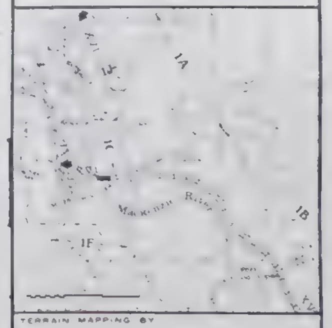
Sedge, grasses, dwarf willow, with lichen and some sphagnum - heath bogs.

Alder and dwarf birch hummock ...

A ... medium priority
...
Two known archaeological sites - Arctic Red River ... priority

...

IF-0200-1004

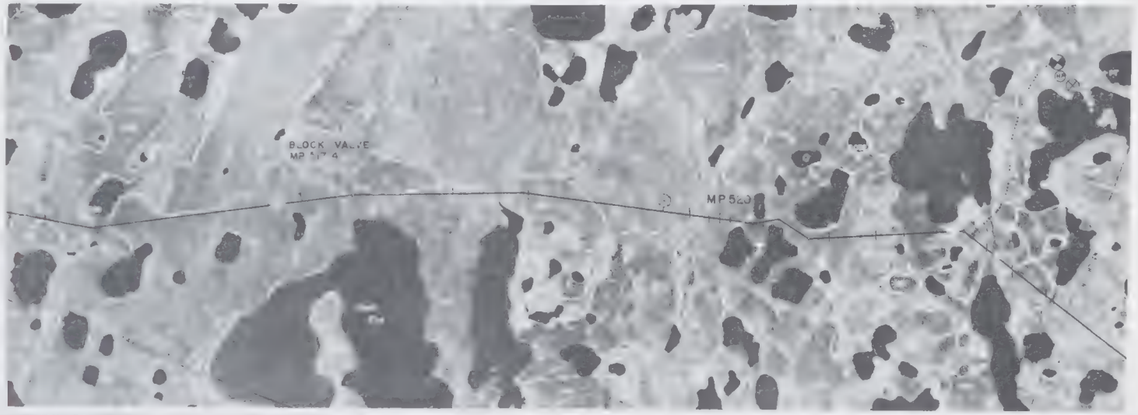


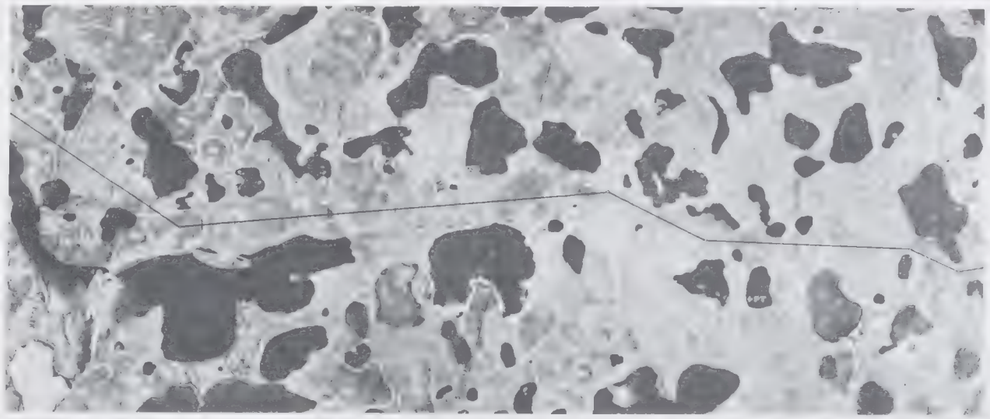
TERRAIN MAPPING BY
J D MOLLARD & ASSOCIATES LIMITED
REGINA, SASK

OWNERSHIP

DRILL HOLE DATA

PROFILE





CONSTRUCTION DATA

REFERENCE DRAWING NO.

DESIGN DATA

FOOTAGE THIS SHEET

U T M GRID ZONE

SCALE 1:25

PIPELINE LEGEND

- PERMANENT ROAD
- TEMPORARY ROAD
- RELIEF
- MEASURING STATION
- COMMUNICATIONS TOWER
- 5 DIE 16 FT
- WINTER TRAIL
- COMPRESSOR STATION
- AIR STRIP
- STAGE OR STAGING AREA
- CAMP SITE
- CROSSING & IMPACT
- WORKING SITE
- WORKS

CARRIER 48.00 x 0.720 WT GRADE 70
HEAVYWALL 48.00 x 1.034 WT GRADE 65

M.T. APPROVED MATTER A

DATE	DESCRIPTION	BY	CHK'D

BOUNDARY AND TRESPASS CONTROL LEGEND

GENERAL NOTES

THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AERIAL PHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSUME HIMSELF OF THIS INFORMATION.

SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE

FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS

* MINIMUM DEPTH OF COVER = 3.0 FEET

APPROVED FOR CONSTRUCTION

MAX. TEST PRESSURE 2100 psig

MAX. OPERATING PRESSURE 680 psig

DATE	REVISION	APPD BY	APPD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY, ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

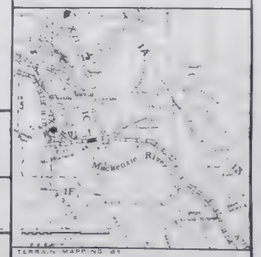
NORTHWEST TERRITORIES, DIST OF MACKENZIE & YUKON TERRITORY

UPSTREAM M.P. DOWNSTREAM M.P.

DRN. BY DATE
CHKD. BY
APPD. BY Jan 9/74

SCALE 1" = 3000'
SHEET 5 OF 6

IF-0200-1005



TERRAIN MAPPING BY

J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

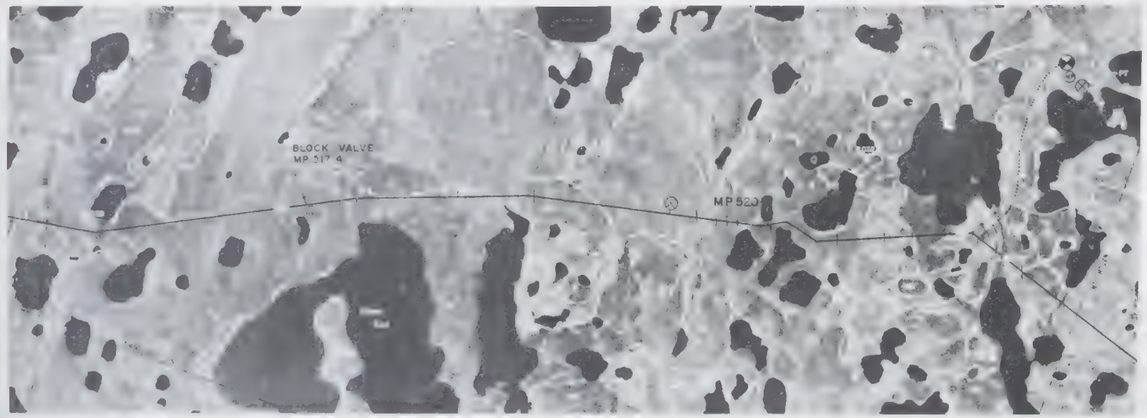
DRILL HOLE DATA

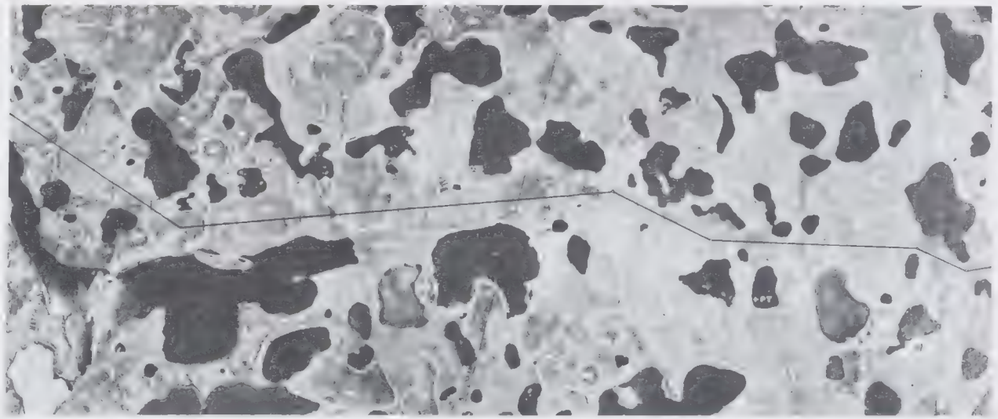
2.0.3.2

2.0.7.3

2.0.7.4

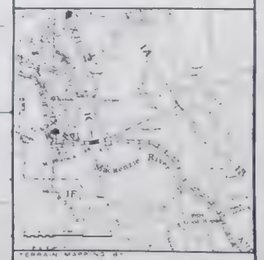
PROFILE





ENVIRONMENTAL DATA AND PROTECTION WORKSHEETS

FISH	Most of these lakes are shallow - expect low winter oxygen levels and few overwintering species - pike probably most common			Old Joe Lake Pike Winter oxygen content very low	
BIRDS	Lake and Pothole area, habitat sensitive to disturbance - waterfowl and shorebirds use area for breeding, moulting, migration from May to September. Low level aircraft flights will be led to right of way inspections				
MAMMALS	Good to excellent habitat for lynx, mink and red fox. Scattered marten habitat. Grizzly bear reported in this area. Low - moderately productive beaver habitat. Muskrats present but population status unknown. Black bear, winter and summer range for moose				
VEGETATION	Dense willow with scattered black spruce. Dwarf birch, lingonberry and moss	Open black spruce with willow, alder, tea, lingonberry, lichen and moss.	Open black spruce mixed with sphagnum and sedge depressions. Alder and some paper birch and lichen in well drained slopes or uplands. Some wet sedge meadows with willow in depressions near lakes.	Dense willow and heath with some open black spruce forest and sedge or sphagnum bogs. Dwarf birch and lingonberry are common throughout.	Dense willow with some scattered black spruce. Understory of heath and moss
LAND USE	Archaeological: low priority - hummocky moraine and outwash plains Known archaeological site: White Lake - maximum priority.				
OTHERS					



TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

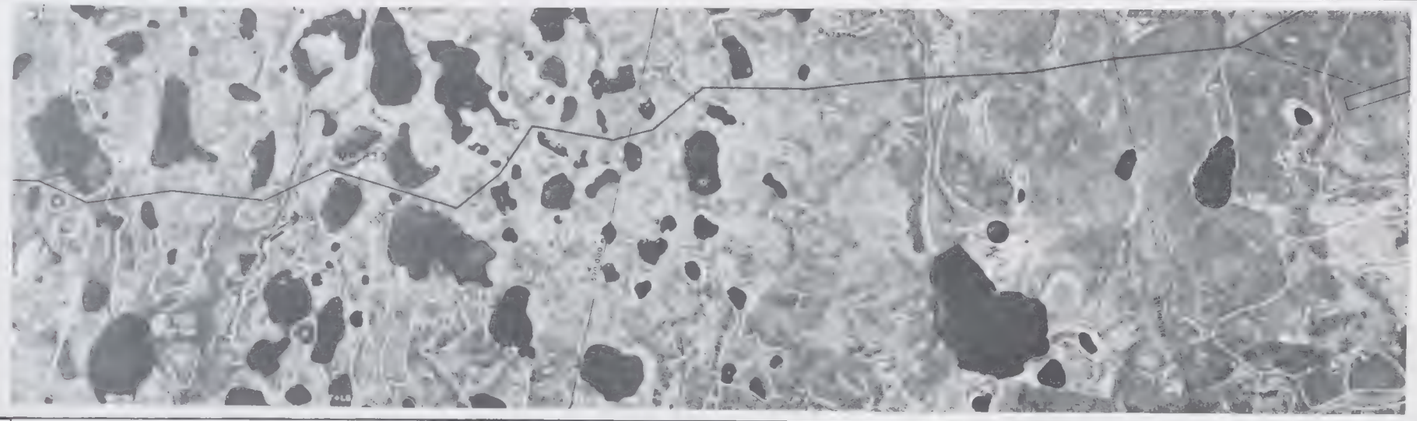
IF-0200-1005

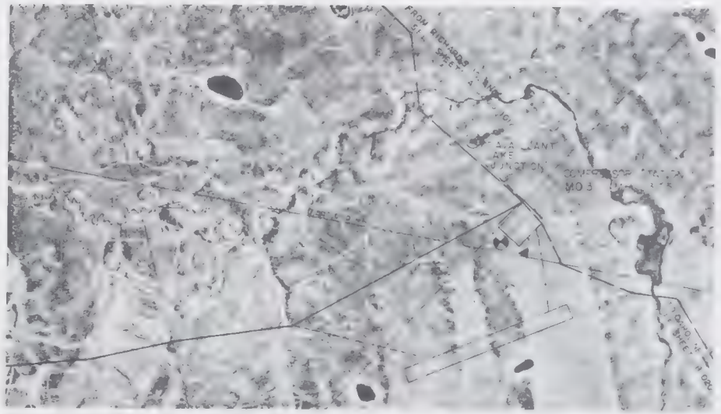
OWNERSHIP

DRILL HOLE DATA

PROFILE

SEGMENT NUMBERS





MATCH LINE

FOOTAGE THIS SHEET

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	0.5	0.4	0.10	0.42	0.21	0.6	0.84	0	0.66	0.12	0.24	0.06	0.76	0.29	0.4	0.08	1.45	1.10		
	EC 8	EC 10	EC 8	EC 10	EC 10	EC 8	EC 10	EC 8	EC 10	EC 8	EC 8	EC 8	EC 8	EC 8	EC 8	EC 8	EC 10	EC 10	EC 10	EC 8
	0.8	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.2		

PIPELINE LEGEND

PERMANENT ROAD
RAILROAD
MEASURING STATION
COMMUN CAT ONS TOWER
SIDE VALVE
WINTER TRAIL
COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
BORROW SITE

PIPE	
CARRIER - 48" OD x 0.720" WT GRADE 70	
HEAVYWALL - 48" OD x 1.034" WT GRADE 65	

MONTH	AND YEAR	MATRIX
MONTH	DESCRIPTION	REQN NO

NORTHWIND AND TROSTEN CONTRACT - LEGEND

B 2 No exposures
B 1 Potential [illegible] along segment
B 1 [illegible] any portions of [illegible]
W A Water in river crossing drawing
EC 1 Average slope along segment less than 3° Excellent [illegible]
EC 2 Average slope along segment greater than 3° Excellent [illegible] required
EC [illegible]
EC 4 Average slope along segment greater than 3° Non excellent [illegible]
EC 5 Cons of measures required on steep sidehills
EC 7 Control measures required on steep slopes
[illegible] Spring seepage area. Measures to prevent siltation drainage

NOTES:
1 THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2 SEGMENT MILEPOST LOCATES MATCH LINE MILEPOST PLUS CHAINAGE VALUE
3 SEE DWG 4-0200-1001 FOR NOMENCLATURE USED FOR "B", DESCRIP ON ON DRILL HOLE LOGS
4 MINIMUM DEPTH OF COVER - 2.5 FEET

AREA [illegible]

PERMIT NO. [illegible]
CONSTRUCTION PERMIT NO.

MIN TEST PRESSURE 2100 psi
MAX OPERATING PRESSURE 1880 psi

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

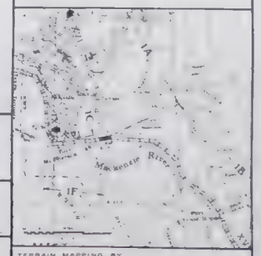
GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
NORTHWEST TERRITORIES (DIST OF MACKENZIE) & YUKON TERRITORY

UPSTREAM M.P. DOWNSTREAM M.P.

SCALE 1" = 2000'
SHEET 6 OF 6

1F-0200-1006

TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

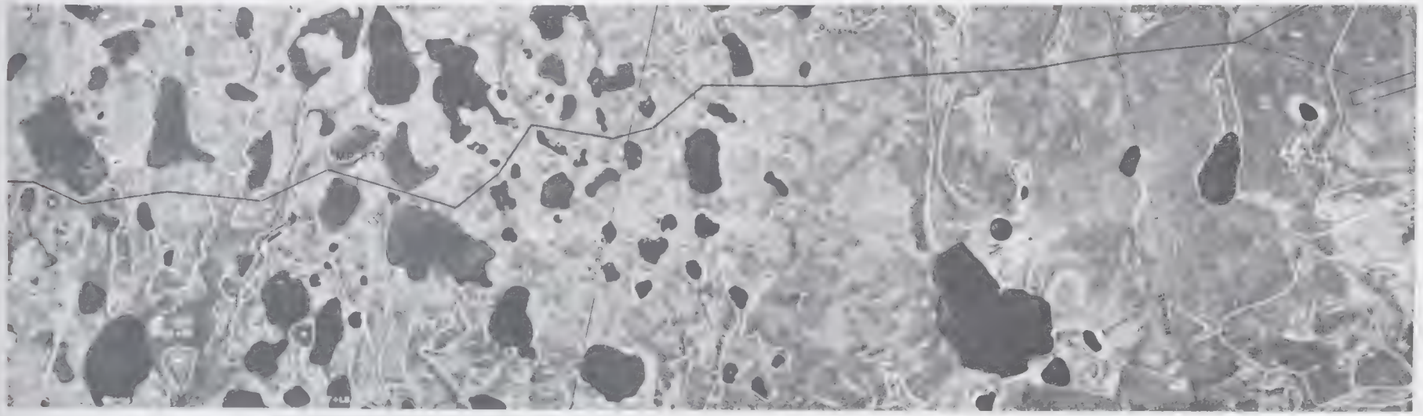


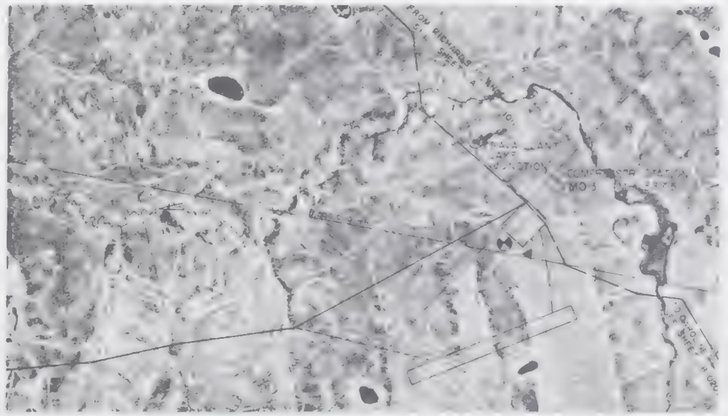
OWNERSHIP

DRILL HOLE DATA

N 73 46

PROFILE





TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED

IF-0200-1006

FLOW DIAGRAMS - CANADA

THIS VOLUME CONTAINS FLOW DIAGRAMS FOR THE

INTERIOR ALTERNATIVE PIPELINE ROUTE

VIA THE MARSH FORK OF THE CANNING RIVER.

FLOW DIAGRAM DESCRIPTION

Section 8 b 4 of this Application includes flow diagrams for the proposed system. The Prudhoe Bay to Travaillant Lake supply line flow diagrams are based upon the "coastal route." Applicant in this Section 14.e 1 presents similar information based upon an alternative to this "coastal route," the interior route along the Marsh Fork branch of the Canning River, one of two such alternatives available. Flow diagrams for the other alternative route, that along the main branch of the Canning River, are also included in this section.

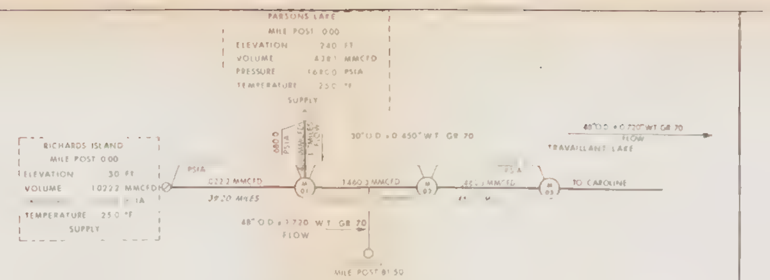
For this route alternative, flow diagrams are presented which show the maximum capacity of Applicant's proposed pipeline system for the first five years of operation, under average winter (October 19 to April 20) and average summer (April 20 to October 19) conditions. The formulae and assumptions used to generate the flow diagrams are given in Section 8 b 2, Flow Formulae and Basic Assumptions. The connecting facilities of Alaskan Arctic Gas Pipeline Company are shown as well as Applicant's facilities in order to demonstrate the capabilities of the combined facilities north of the Canada United States border.

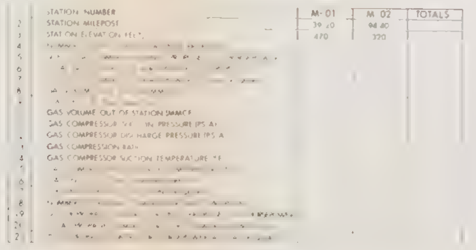
The proposed system includes two gas supply lines which join at the origin of the main line at Travaillant Lake, the main line from Travaillant Lake to Caroline, Alberta, and two gas delivery lines which begin at the terminus of the main line near Caroline, as shown in Section 8 a 2, System Map. The data shown on the flow diagrams for the two gas supply lines and the two gas delivery lines reflect the maximum capacity of the entire system. That is, the sum of the maximum delivery capacities of the two gas supply lines is equal to the maximum capacities of the main line at its inlet, and the sum of the maximum capacities of the two gas delivery lines at their inlets is equal to the maximum delivery capacity of the main line. Each gas supply and gas delivery line has a maximum capacity somewhat in excess of that shown, but these capacities cannot be used simultaneously because the total flow is restricted by the maximum capacity of the main line. The maximum capacity of the main line at its inlet is prorated to each gas supply line in proportion to the design gas volumes from each supply source. The maximum delivery capacity of the main lines is divided equally between the two gas delivery lines.

As discussed in detail in Section 8 b 1, System Configuration, compressor station equipment was selected so that no major equipment replacement would be required to transport optimum gas volumes (i.e., those volumes that result in the lowest unit cost of service). As a result, there is excess compressor horsepower available at the compressor stations on the gas supply and gas delivery lines because the volumes in these lines are below optimum levels.

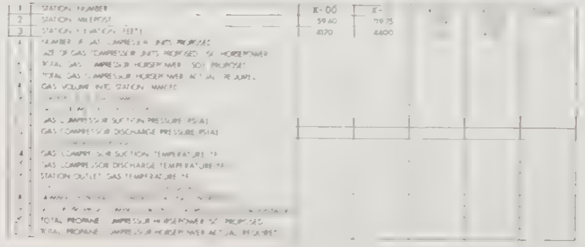
There is also excess compressor horsepower available on the main line of the system in the first operating year as a result of balancing the construction resource requirements for the facilities required for the first and second operating years. Three compressor stations M 07, M 11 and M 15, that are not required by the projected gas volumes until the second operating year, are constructed for the first operating year. In addition, facilities in excess of those required for the first operating year are constructed at Stations M 19, M 21, M 25, M 29 and M 33. Each of the stations in this latter group requires a single compressor unit for the first year gas volumes, two units are required for the second operating year and are installed for the first operating year. Similarly, the gas cooling facilities at Stations M 21, M 25, M 29 and M 33 are not required until the second operating year but are installed for the first operating year.

It is assumed that these excess facilities will be completed to the extent they can be started and operated to check out all the equipment and ensure that the facilities are ready for the second year of operation. The facilities will be available for service but will not normally be used during the first operating year. The flow diagrams for the first operating year, therefore, reflect that the excess facilities are not used but are available.

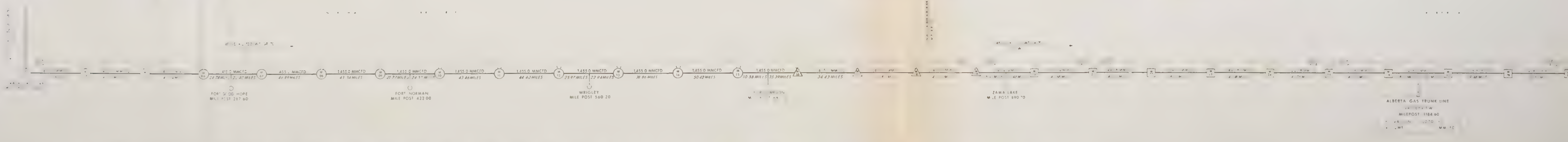


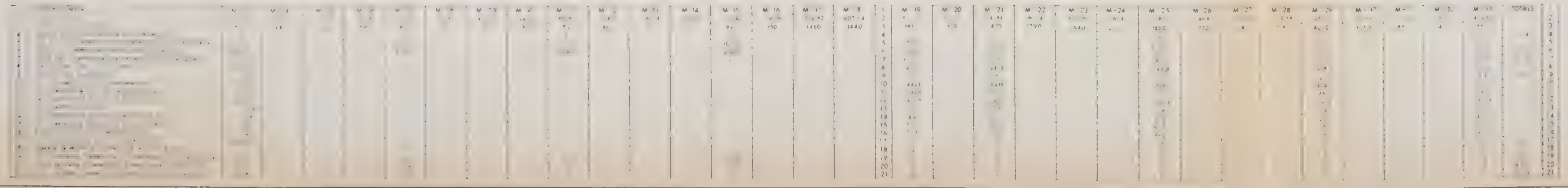


RICHARDS ISLAND to TRAVAILLANT LAKE GAS SUPPLY LINE

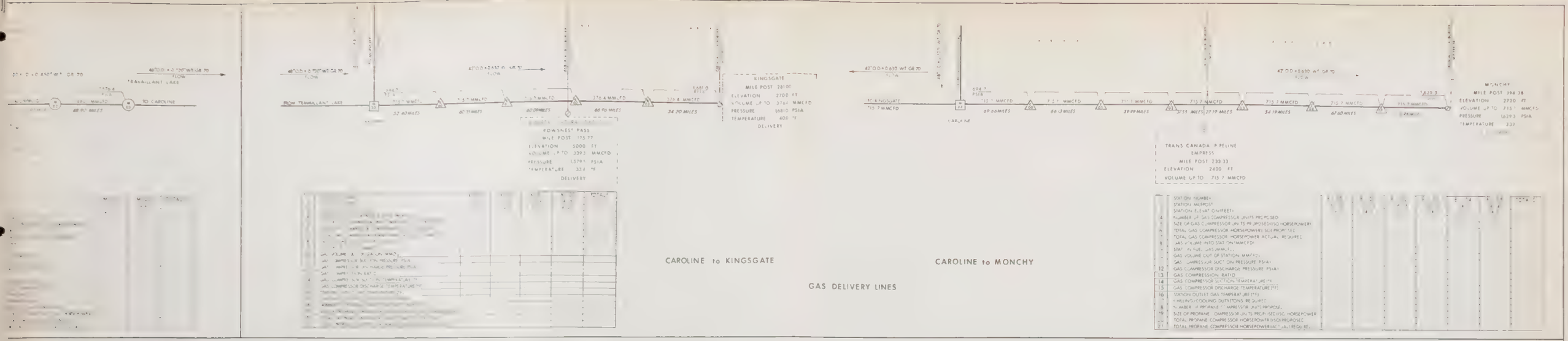


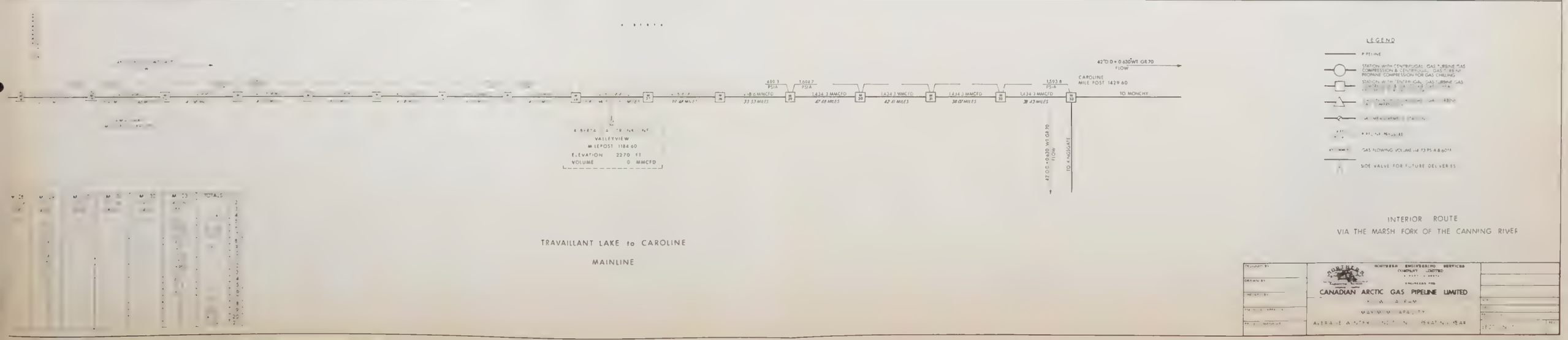
CAROLINE to KINGSGATE

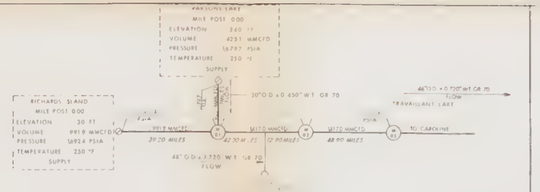




TRAVAILLANT LAKE to CAROLINE MAINLINE

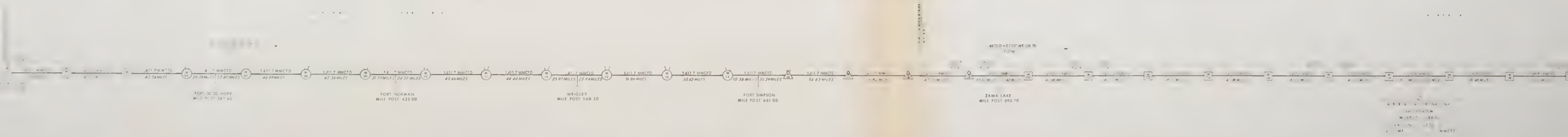

TO CAROLINE
TRAVAILLANT LAKE
FROM TRAVAILLANT LAKE
KINGSGATE
MILE POST 281.00
ELEVATION 2700 FT
VOLUME UP TO 3764 MMCFD
PRESSURE 1681.0 PSIA
TEMPERATURE 400 °F
DELIVERY
ROWSNEST PASS
MILE POST 175.77
ELEVATION 5000 FT
VOLUME UP TO 3393 MMCFD
PRESSURE 1579.5 PSIA
TEMPERATURE 334 °F
DELIVERY
TO KINGSGATE
CARLYLE
MONCHY
MILE POST 394.38
ELEVATION 2720 FT
VOLUME UP TO 715.7 MMCFD
PRESSURE 1629.3 PSIA
TEMPERATURE 332
TRANS CANADA PIPELINE
EMPRESS
MILE POST 233.33
ELEVATION 2400 FT
VOLUME UP TO 715.7 MMCFD
TOTALS
CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES


42"O.D.×0.630" WT GR.70
FLOW
CAROLINE
MILE POST 1429.60
TO MONCHY
TO KINGSGATE
VALLEYVIEW
MILEPOST 1184.60
ELEVATION 2270 FT
VOLUME 0 MMCFD
TRAVAILLANT LAKE to CAROLINE
MAINLINE
LEGEND
PIPELINE
SIDE VALVE FOR FUTURE DELIVERIES
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CANADIAN ARCTIC GAS PIPELINE LIMITED

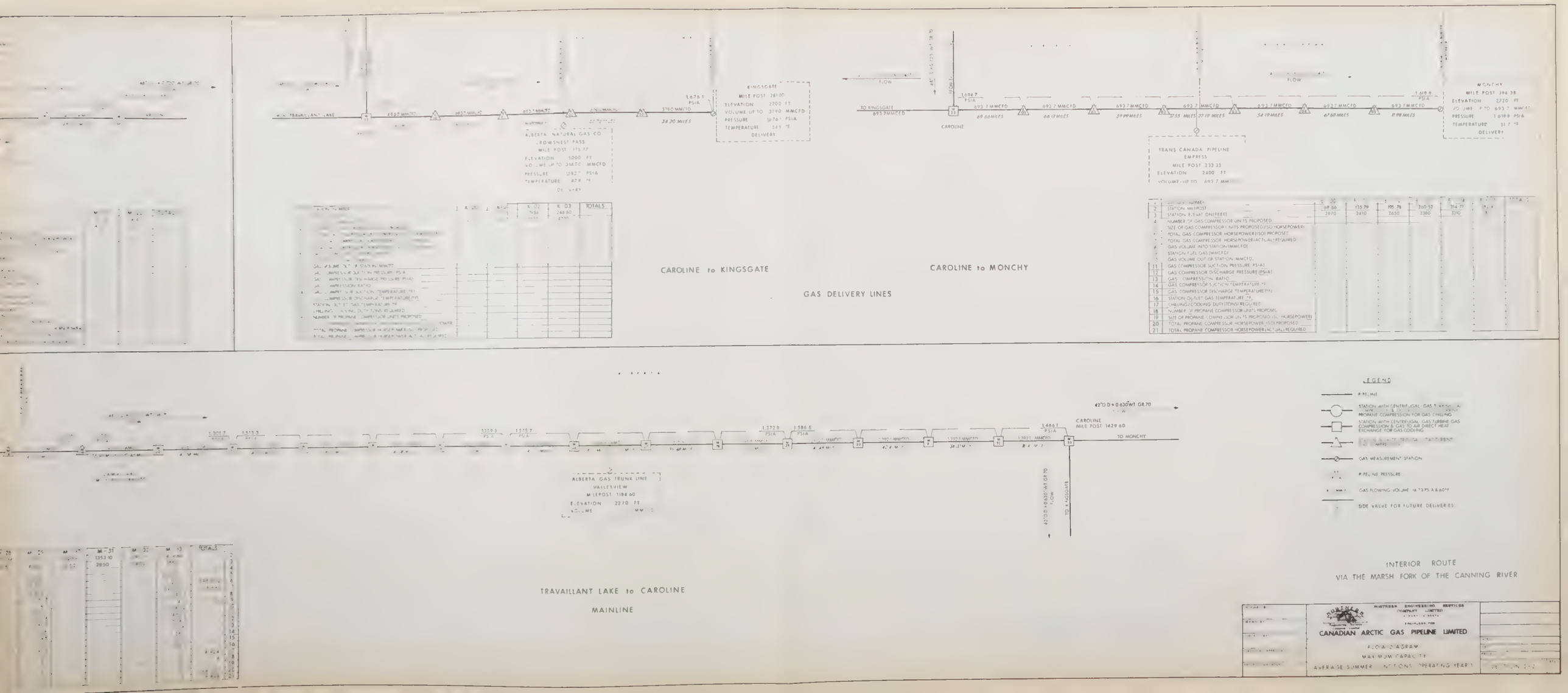


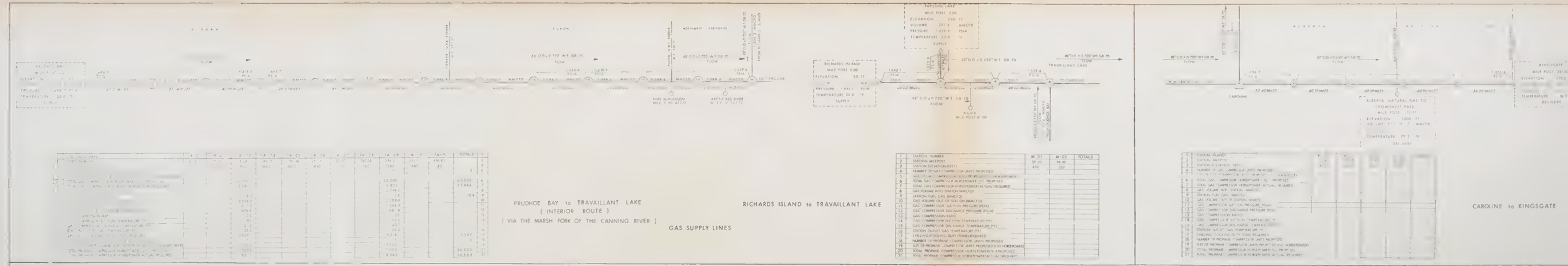
RICHARDS ISLAND to TRAVAILLANT LAKE
GAS SUPPLY LINE

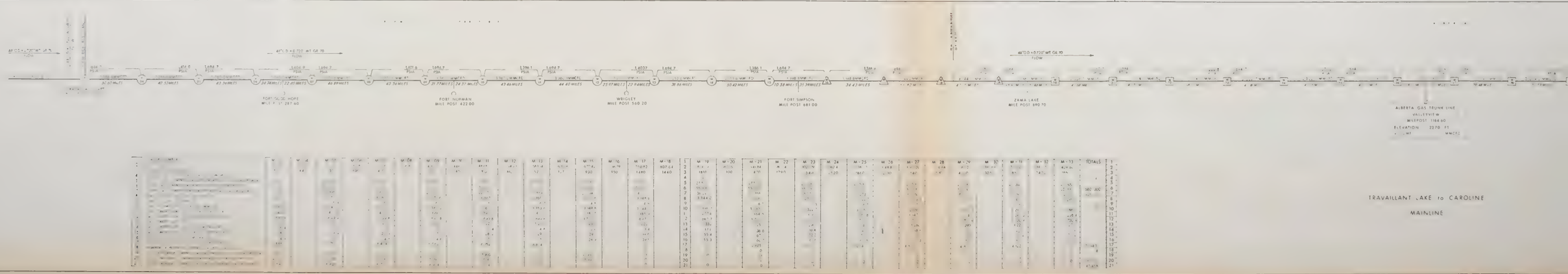
CAROLINE to KINGSGATE

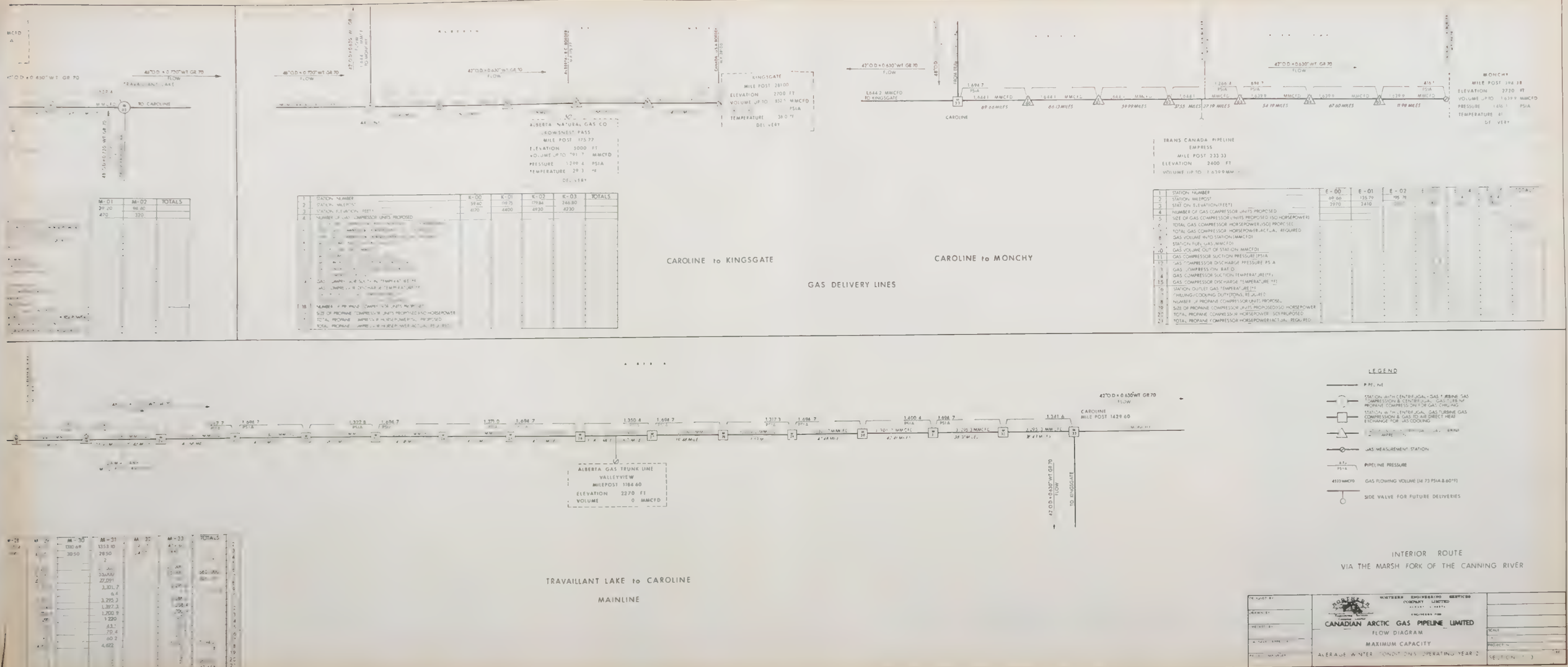


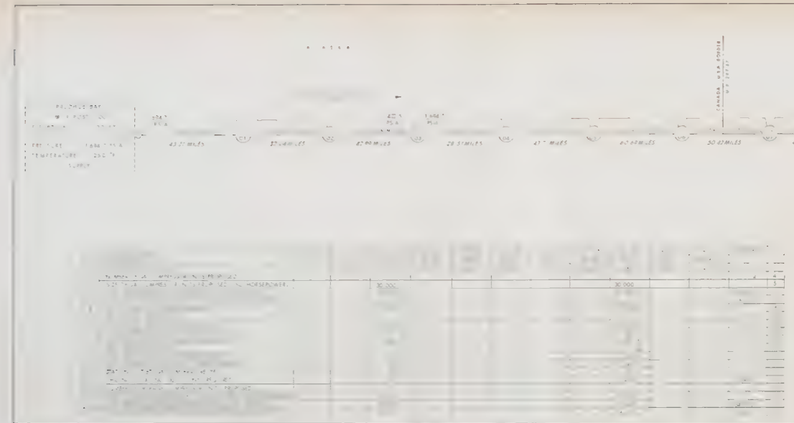
TRAVAILLANT LAKE to CAROLINE
MAIN LINE


KINGSGATE
MILE POST 28100
ELEVATION 2700 FT
VOLUME UP TO 3790 MMCFD
PRESSURE 1676.1 PSIA
TEMPERATURE 54.5 °F
DELIVERY
ALBERTA NATURAL GAS CO
BROWSNEST PASS
MILE POST 175.77
ELEVATION 5000 FT
VOLUME UP TO 3787.0 MMCFD
PRESSURE 1580.7 PSIA
TEMPERATURE 67.9 °F
DELIVERY
3790 MMCFD
38.30 MILES
TO KINGSGATE
693.7 MMCFD
CAROLINE
1,696.7 PSIA
693.7 MMCFD
69.66 MILES
66.13 MILES
59.99 MILES
39.55 MILES
27.19 MILES
54.19 MILES
67.60 MILES
17.98 MILES
FLOW
TRANS CANADA PIPELINE
EMPRESS
MILE POST 233.33
ELEVATION 2400 FT
VOLUME UP TO 693.7 MMCFD
MONCHY
MILE POST 396.38
ELEVATION 2720 FT
VOLUME UP TO 693.7 MMCFD
PRESSURE 1,619.9 PSIA
TEMPERATURE 51.7 °F
DELIVERY
CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
K 02
K 03
TOTALS
69.66
135.79
195.78
260.52
314.71
2970
2410
2650
2380
3310
NUMBER OF GAS COMPRESSOR UNITS PROPOSED
SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)
TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED
TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED
GAS VOLUME INTO STATION (MMCFD)
STATION FUEL GAS (MMCFD)
GAS VOLUME OUT OF STATION (MMCFD)
GAS COMPRESSOR SUCTION PRESSURE (PSIA)
GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)
GAS COMPRESSION RATIO
GAS COMPRESSOR SUCTION TEMPERATURE (°F)
GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)
STATION OUTLET GAS TEMPERATURE (°F)
CHILLING/COOLING DUTY (TONS) REQUIRED
NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED
SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)
TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED
TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED
1,301.7
1,319.3
1,359.3 PSIA
1,375.7 PSIA
1,772.9 PSIA
1,586.5 PSIA
1,466.1 PSIA
CAROLINE
MILE POST 1429.60
TO MONCHY
ALBERTA GAS TRUNK LINE
VALLEYVIEW
MILEPOST 1184.60
ELEVATION 2270 FT
VOLUME
M-31
M-32
M-13
TOTALS
1353.10
2850
TRAVAILLANT LAKE to CAROLINE
MAINLINE
LEGEND
PIPELINE
STATION WITH CENTRIFUGAL GAS TURBINE GAS COMPRESSION & PROPANE COMPRESSION FOR GAS CHILLING
STATION WITH CENTRIFUGAL GAS TURBINE GAS COMPRESSION & GAS TO AIR DIRECT HEAT EXCHANGE FOR GAS COOLING
GAS MEASUREMENT STATION
PIPELINE PRESSURE
GAS FLOWING VOLUME (@ 14.73 PSIA & 60°F)
SIDE VALVE FOR FUTURE DELIVERIES
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
NORTHERN
CANADIAN ARCTIC GAS PIPELINE LIMITED
FLOW DIAGRAM
MAXIMUM CAPACITY
AVERAGE SUMMER


PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)
GAS SUPPLY LINES
RICHARDS ISLAND to TRAVAILLANT LAKE
CAROLINE to KINGSGATE

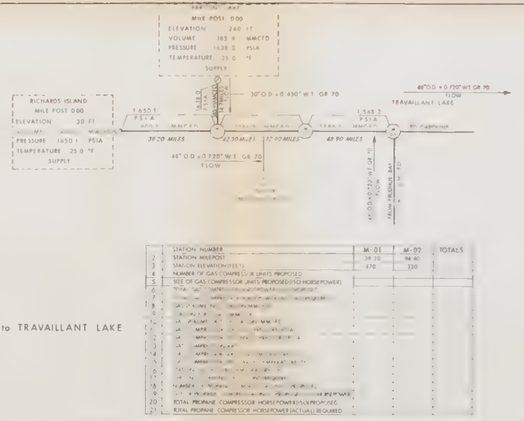

TRAVAILLANT LAKE to CAROLINE
MAINLINE


CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRAVAILLANT LAKE to CAROLINE
MAINLINE
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
LEGEND
PIPELINE
GAS MEASUREMENT STATION
PIPELINE PRESSURE
SIDE VALVE FOR FUTURE DELIVERIES
CANADIAN ARCTIC GAS PIPELINE LIMITED
FLOW DIAGRAM
MAXIMUM CAPACITY
ALBERTA GAS TRUNK LINE
VALLEYVIEW
MILEPOST 1184.60
ELEVATION 2270 FT
VOLUME 0 MMCFD
TRANS CANADA PIPELINE
EMPRESS
MILE POST 233.33
ELEVATION 2400 FT
VOLUME UP TO 1,639.9 MMCFD
CAROLINE
MILE POST 1429.60
TO KINGSGATE
TO CAROLINE



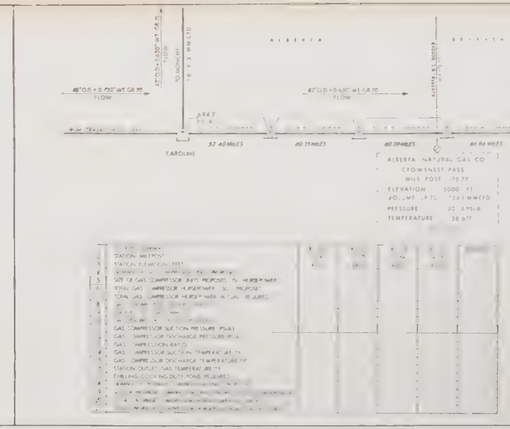
PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)

GAS SUPPLY LINES



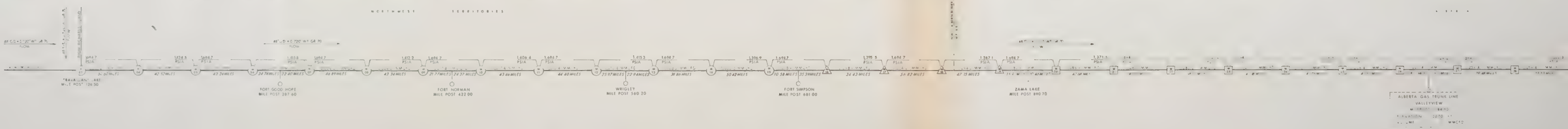
RICHARDS ISLAND to TRAVAILLANT LAKE

	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	96.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER PROPOSED			
7	NUMBER OF GAS COMPRESSOR UNITS REQUIRED			
8	SIZE OF GAS COMPRESSOR UNITS REQUIRED (HORSEPOWER)			
9	TOTAL GAS COMPRESSOR HORSEPOWER REQUIRED			
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
12	GAS COMPRESSOR RATIO			
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
15	STATION OUTLET GAS TEMPERATURE (°F)			
16	CHILLING/COOLING DUTY (TONS REFRIGERATION)			
17	[illegible]			
18	[illegible]			
19	[illegible]			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			



CAROLINE to KINGSGATE

	STATION NUMBER	M-03	M-04
2	STATION MILEPOST		
3	STATION ELEVATION (FEET)		
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)		
6	TOTAL GAS COMPRESSOR HORSEPOWER PROPOSED		
7	NUMBER OF GAS COMPRESSOR UNITS REQUIRED		
8	SIZE OF GAS COMPRESSOR UNITS REQUIRED (HORSEPOWER)		
9	TOTAL GAS COMPRESSOR HORSEPOWER REQUIRED		
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		
12	GAS COMPRESSOR RATIO		
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		
15	STATION OUTLET GAS TEMPERATURE (°F)		
16	CHILLING/COOLING DUTY (TONS REFRIGERATION)		
17	[illegible]		
18	[illegible]		
19	[illegible]		
20	TOTAL PROPANE COMPRESSOR HORSEPOWER PROPOSED		
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		

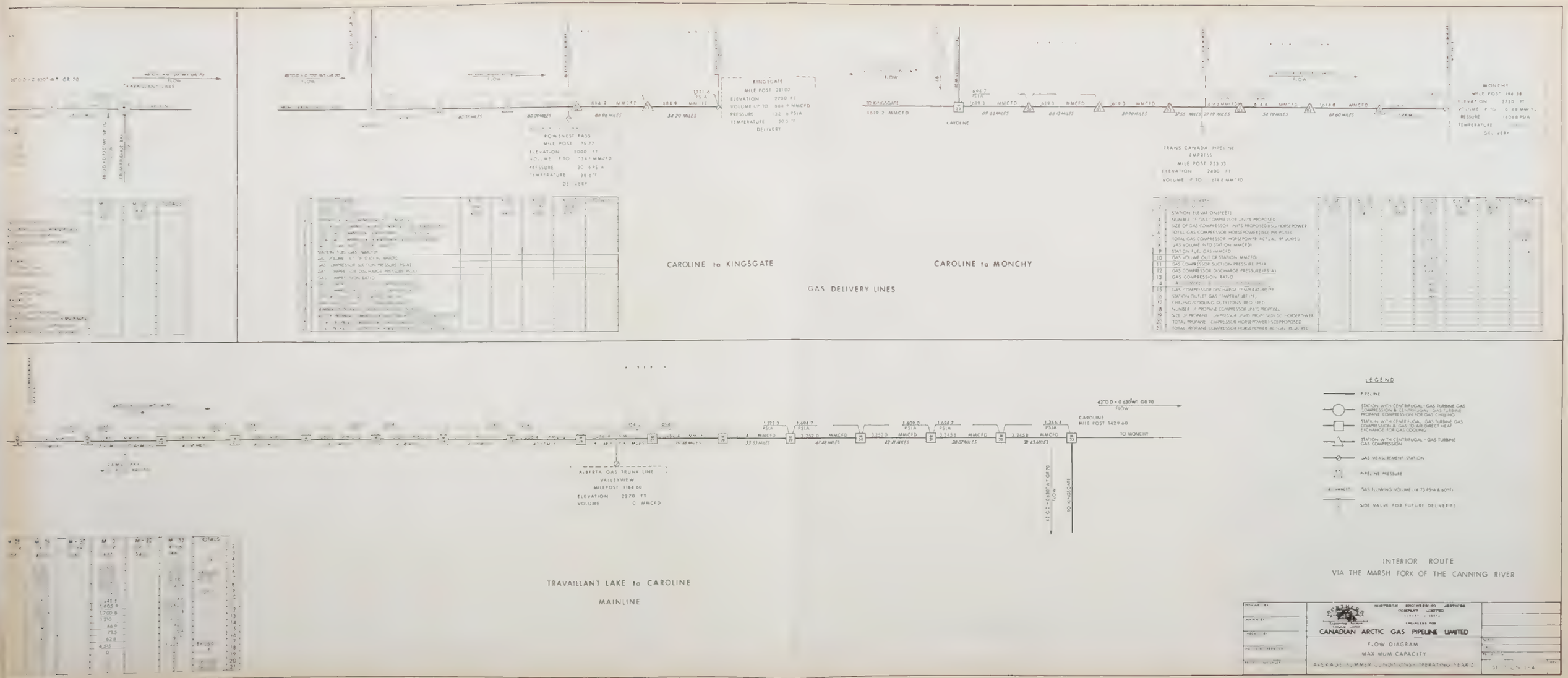


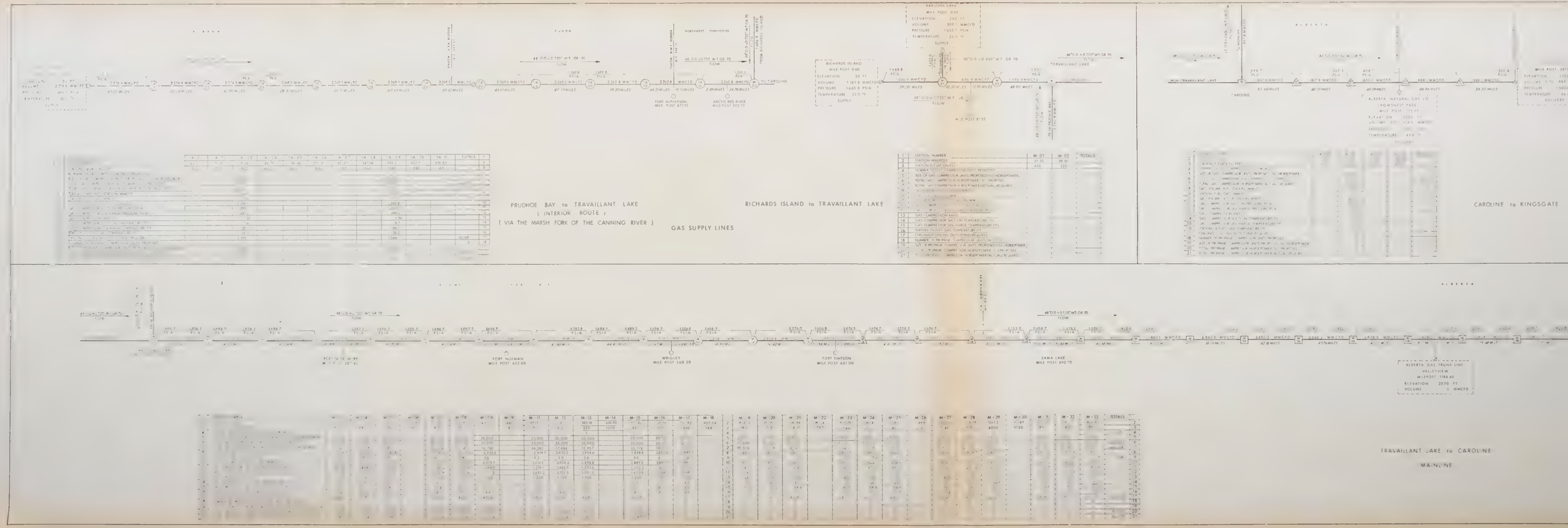
	STATION NUMBER	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	STATION ELEVATION (FEET)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED														
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)														
6	TOTAL GAS COMPRESSOR HORSEPOWER PROPOSED														
7	NUMBER OF GAS COMPRESSOR UNITS REQUIRED														
8	SIZE OF GAS COMPRESSOR UNITS REQUIRED (HORSEPOWER)														
9	TOTAL GAS COMPRESSOR HORSEPOWER REQUIRED														
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)														
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)														
12	GAS COMPRESSOR RATIO														
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)														
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)														
15	STATION OUTLET GAS TEMPERATURE (°F)														
16	CHILLING/COOLING DUTY (TONS REFRIGERATION)														
17	[illegible]														
18	[illegible]														
19	[illegible]														
20	TOTAL PROPANE COMPRESSOR HORSEPOWER PROPOSED														
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED														

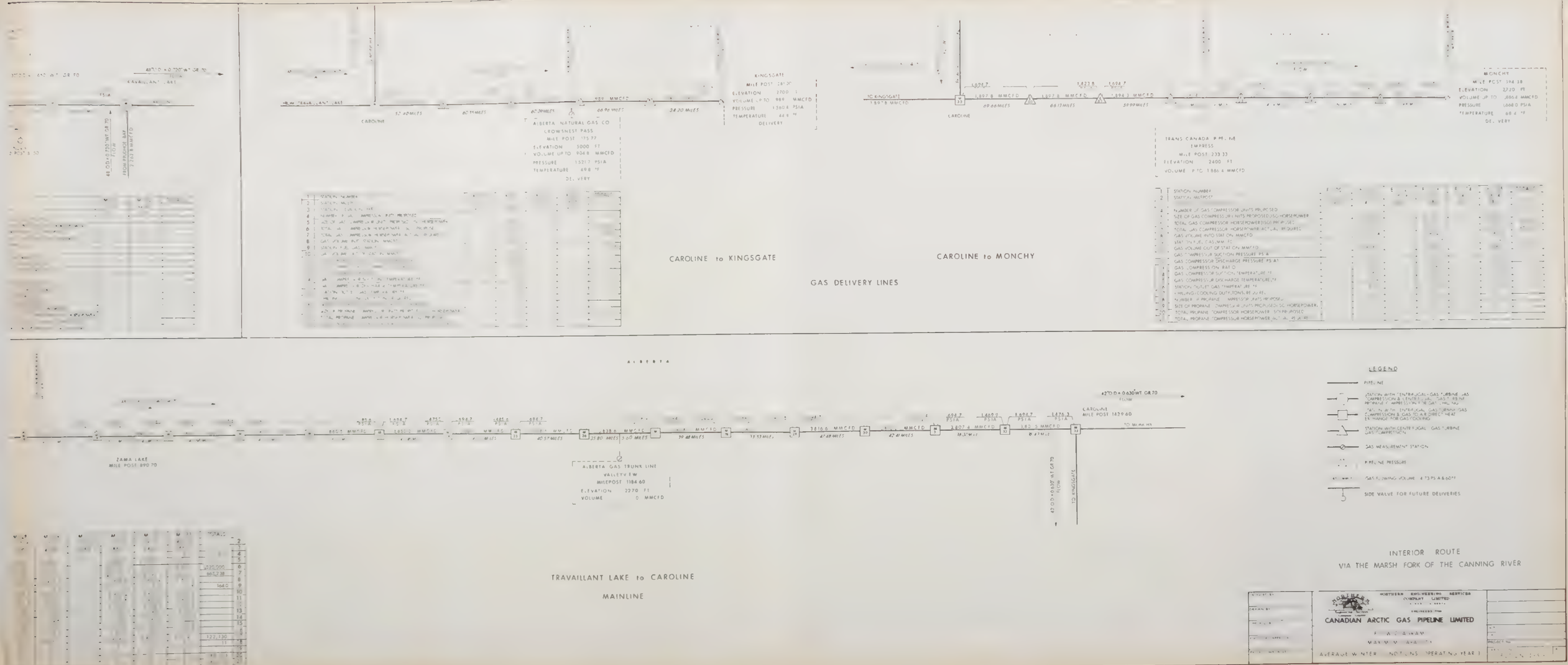
	STATION NUMBER	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
2	STATION MILEPOST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
3	STATION ELEVATION (FEET)	[illegible]	1100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)	[illegible]		[illegible]		[illegible]				[illegible]		27,500		27,500			
6	TOTAL GAS COMPRESSOR HORSEPOWER PROPOSED											55,000		55,000			[illegible]
7	NUMBER OF GAS COMPRESSOR UNITS REQUIRED	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		31,007		26,223		[illegible]	[illegible]
8	SIZE OF GAS COMPRESSOR UNITS REQUIRED (HORSEPOWER)	[illegible]		[illegible]		[illegible]				[illegible]				2,357.0		[illegible]	[illegible]
9	TOTAL GAS COMPRESSOR HORSEPOWER REQUIRED	[illegible]		[illegible]		[illegible]				[illegible]				[illegible]			
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]				3,343.6		[illegible]	
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]				1,455.9		[illegible]	
12	GAS COMPRESSOR RATIO	[illegible]		[illegible]		[illegible]				[illegible]				[illegible]			
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		60		1210			
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]				469		[illegible]	
15	STATION OUTLET GAS TEMPERATURE (°F)	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]				732			
16	CHILLING/COOLING DUTY (TONS REFRIGERATION)	[illegible]		[illegible]		[illegible]				[illegible]		[illegible]		628			
17	[illegible]			[illegible]										4,250			[illegible]
18	[illegible]													0			
19	[illegible]																
20	TOTAL PROPANE COMPRESSOR HORSEPOWER PROPOSED													0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED																

TRAVAILLANT LAKE to CAROLINE

MAINLINE


CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRAVAILLANT LAKE to CAROLINE
MAINLINE
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
LEGEND
CANADIAN ARCTIC GAS PIPELINE LIMITED
FLOW DIAGRAM
MAXIMUM CAPACITY


PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)
GAS SUPPLY LINES
RICHARDS ISLAND to TRAVAILLANT LAKE
CAROLINE to KINGSGATE
TRAVAILLANT LAKE to CAROLINE
MAINLINE
ALBERTA
YUKON
FORT MCPHERSON
MILE POST 477.72
ARCTIC RED RIVER
MILE POST 102.72
TO CAROLINE
FROM RICHARDS ISLAND
RICHARDS ISLAND
MILE POST 0.00
ELEVATION 30 FT
VOLUME 1187.8 MMCFD
PRESSURE 1668.8 PSIA
TEMPERATURE 25.0 °F
SUPPLY
PARSONS LAKE
MILE POST 0.00
ELEVATION 240 FT
VOLUME 309.1 MMCFD
PRESSURE 1652.2 PSIA
TEMPERATURE 25.0 °F
SUPPLY
TRAVAILLANT LAKE
CAROLINE
ALBERTA NATURAL GAS CO
CROWSNEST PASS
MILE POST 175.77
ELEVATION 5200 FT
VOLUME 0.0 MMCFD
PRESSURE 498 PSIA
TEMPERATURE 498 °F
DELIVERY
MILE POST 289.7
ELEVATION 1700
VOLUME 3.70 MMCFD
PRESSURE 1460
TEMPERATURE 34
DELIVERY
FORT NORMAN
MILE POST 422.00
WRIGLEY
MILE POST 560.20
FORT SIMPSON
MILE POST 681.00
ZAMA LAKE
MILE POST 890.70
ALBERTA GAS TRUNK LINE
VALLEYVIEW
MILEPOST 1184.40
ELEVATION 2270 FT
VOLUME 0 MMCFD
STATION NUMBER
STATION MILEPOST
TOTALS


CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRAVAILLANT LAKE to CAROLINE
MAINLINE
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
LEGEND
CANADIAN ARCTIC GAS PIPELINE LIMITED

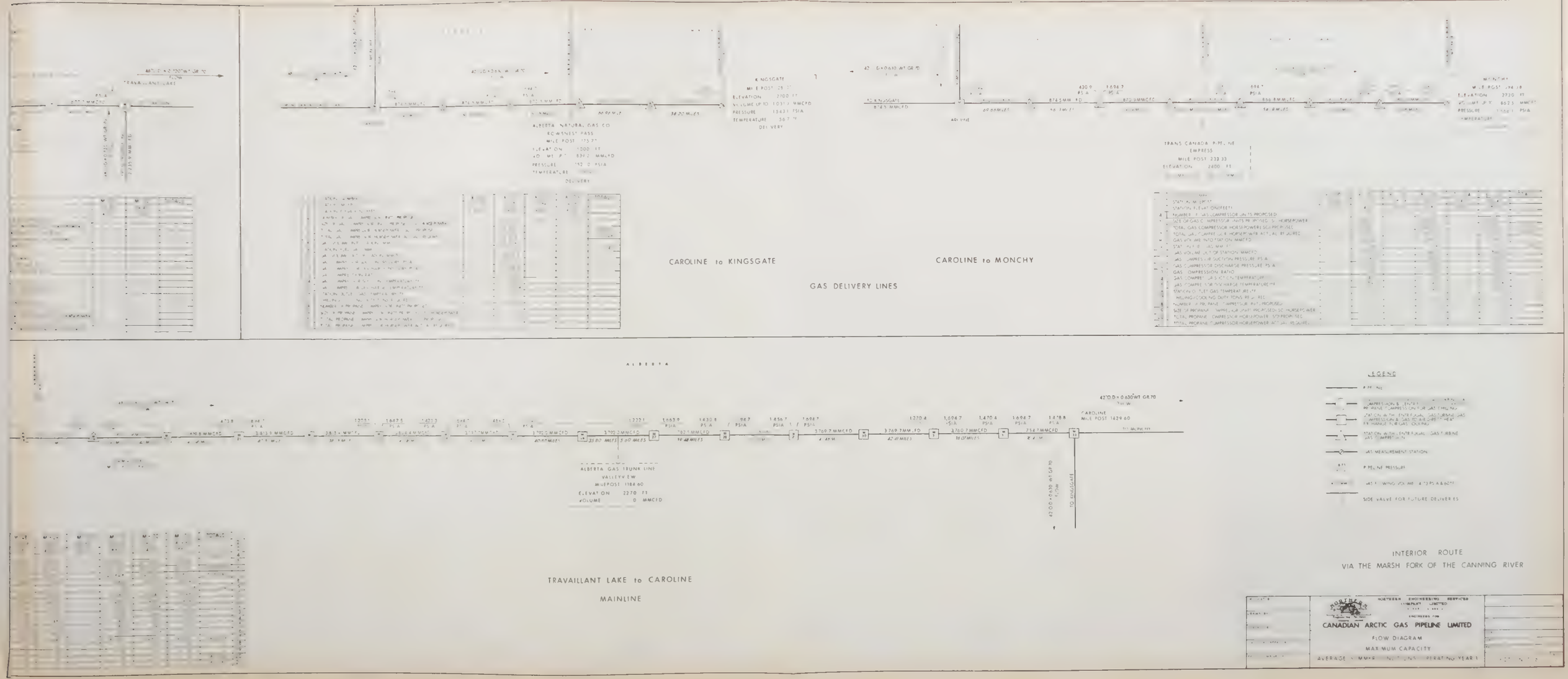
PEACHUE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)

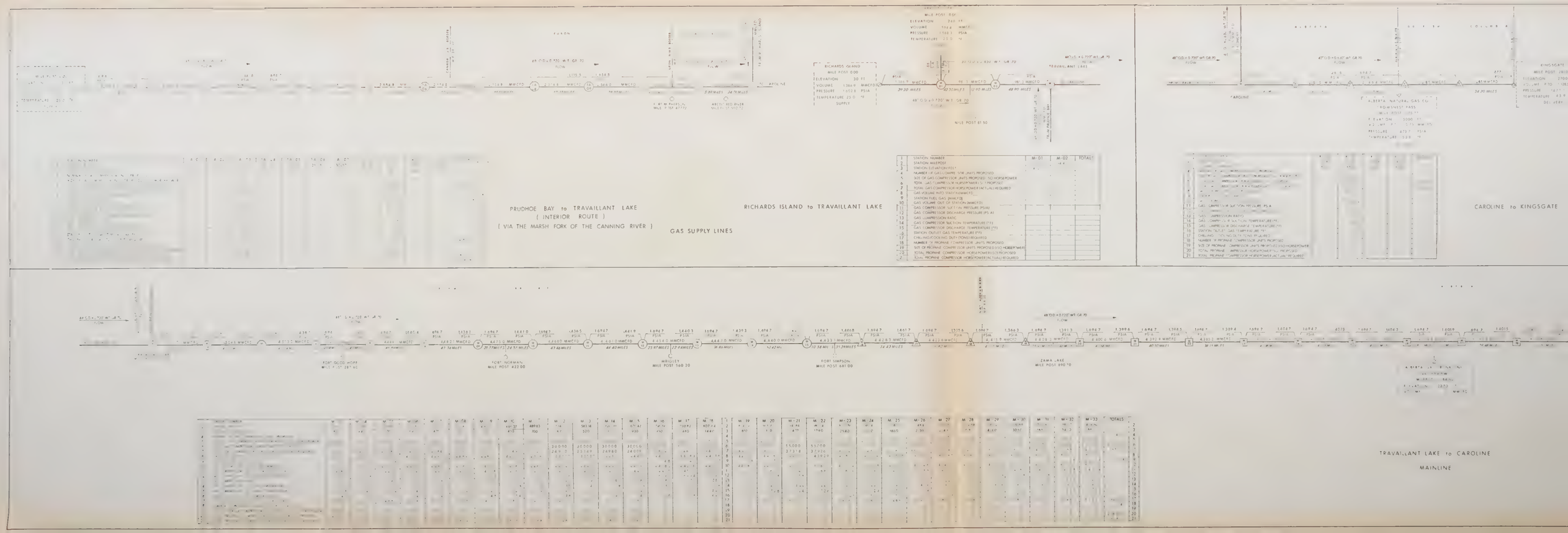
GAS SUPPLY LINES

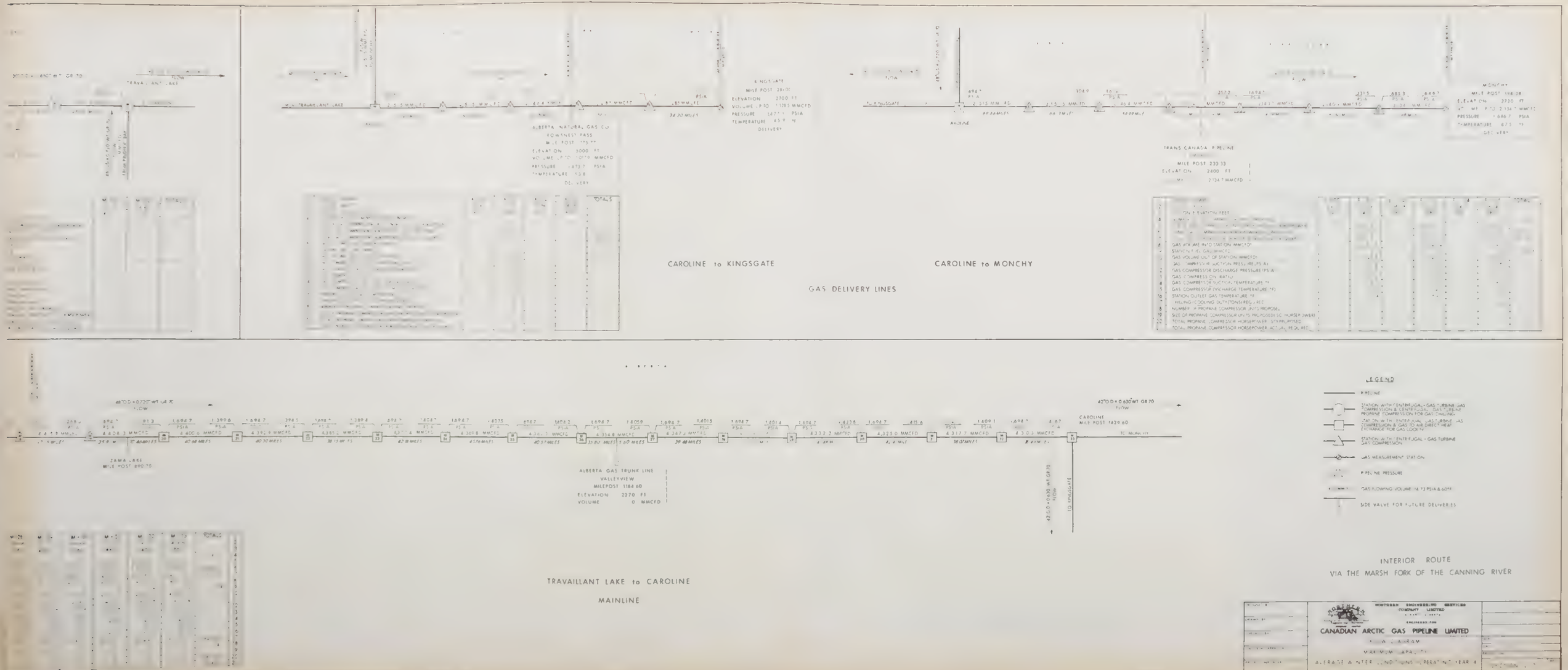
RICHARDS ISLAND to TRAVAILLANT LAKE

CAROLINE to KINGSGATE

TRAVAILLANT LAKE to CAROLINE
MAINLINE


TRAVAILLANT LAKE
ALBERTA NATURAL GAS CO
KINGSGATE
DELIVERY
CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRANS CANADA PIPELINE
EMPRESS
MILE POST 233.33
ELEVATION 2400 FT
ALBERTA
ALBERTA GAS TRUNK LINE
VALLEYVIEW
MILEPOST 1184.60
ELEVATION 2270 FT
VOLUME 0 MMCFD
CAROLINE
MILE POST 1429.60
TO KINGSGATE
TRAVAILLANT LAKE to CAROLINE
MAINLINE
LEGEND
SIDE VALVE FOR FUTURE DELIVERIES
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED
FLOW DIAGRAM
MAXIMUM CAPACITY


PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)
GAS SUPPLY LINES
RICHARDS ISLAND to TRAVAILLANT LAKE
CAROLINE to KINGSGATE
TRAVAILLANT LAKE to CAROLINE
MAINLINE
RICHARDS ISLAND
MILE POST 000
ELEVATION 30 ft
VOLUME 1360.0 MMCFD
PRESSURE 1608.8 PSIA
TEMPERATURE 25.0 °F
SUPPLY
MILE POST 61.50
TRAVAILLANT LAKE
CAROLINE
ALBERTA NATURAL GAS CO
ROCKY WEST PASS
MILE POST 108.37
KINGSGATE
MILE POST 280.0
FORT GOOD HOPE
FORT NORMAN
MILE POST 422.00
WRIGLEY
MILE POST 560.20
FORT SIMPSON
MILE POST 681.00
ZAMA LAKE
MILE POST 890.70
STATION NUMBER
STATION MILEPOST
STATION ELEVATION (FEET)
NUMBER OF GAS COMPRESSOR UNITS PROPOSED
SIZE OF GAS COMPRESSOR UNITS PROPOSED (SO HORSEPOWER)
TOTAL GAS COMPRESSOR HORSEPOWER (S) PROPOSED
TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED
GAS VOLUME INTO STATION (MMCFD)
STATION FUEL GAS (MMCFD)
GAS VOLUME OUT OF STATION (MMCFD)
GAS COMPRESSOR SUCTION PRESSURE (PSIA)
GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)
GAS COMPRESSION RATIO
GAS COMPRESSOR SUCTION TEMPERATURE (°F)
GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)
STATION OUTLET GAS TEMPERATURE (°F)
CHILLING/COOLING DUTY (TONS) REQUIRED
NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED
SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (SO HORSEPOWER)
TOTAL PROPANE COMPRESSOR HORSEPOWER (S) PROPOSED
TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED
M-01
M-02
TOTALS


CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRAVAILLANT LAKE to CAROLINE
MAINLINE
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
LEGEND
CANADIAN ARCTIC GAS PIPELINE LIMITED

PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)

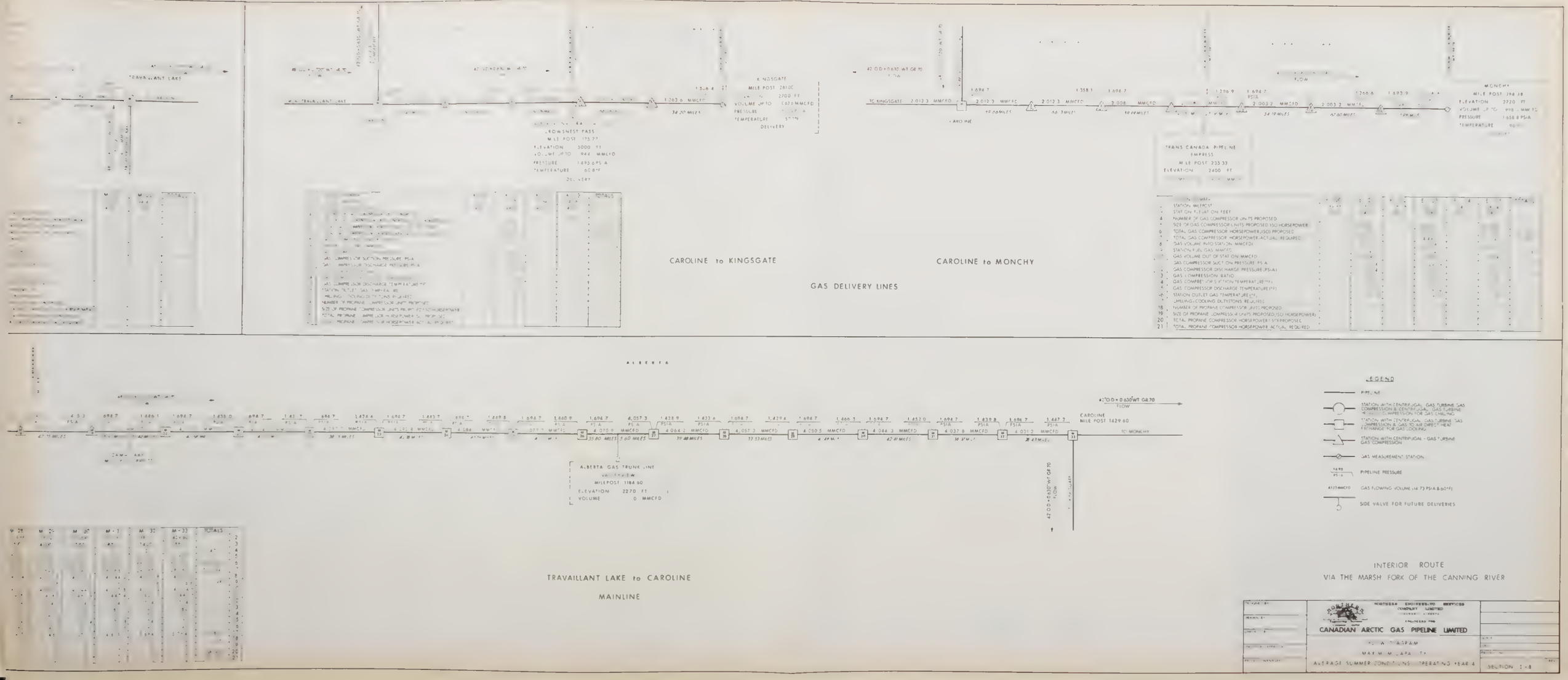
GAS SUPPLY LINES

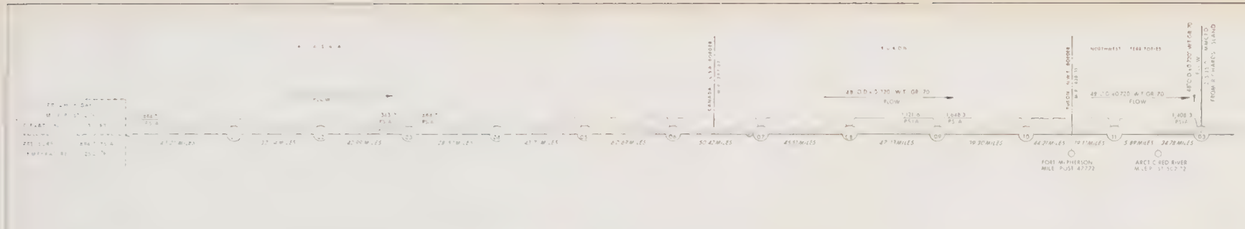
RICHARDS ISLAND to TRAVAILLANT LAKE

CAROLINE to KINGSGATE

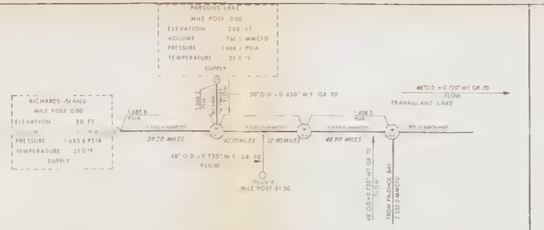
TRAVAILLANT LAKE to CAROLINE

MAINLINE


CAROLINE to KINGSGATE
CAROLINE to MONCHY
GAS DELIVERY LINES
TRAVAILLANT LAKE to CAROLINE
MAINLINE
INTERIOR ROUTE
VIA THE MARSH FORK OF THE CANNING RIVER
LEGEND
PIPELINE
PIPELINE PRESSURE
SIDE VALVE FOR FUTURE DELIVERIES
CANADIAN ARCTIC GAS PIPELINE LIMITED
AVERAGE SUMMER CONDITIONS OPERATING YEAR 4
SECTION 1-8



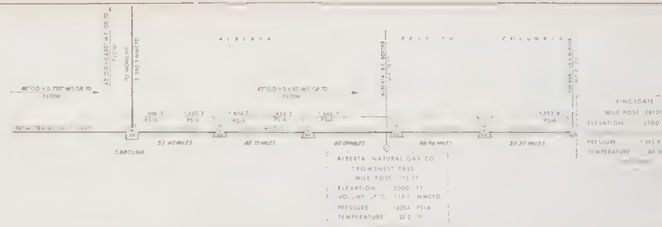
PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(THE NORTH FORK OF THE PANNING RIVER)



RICHARDS ISLAND to TRAVAILLANT LAKE

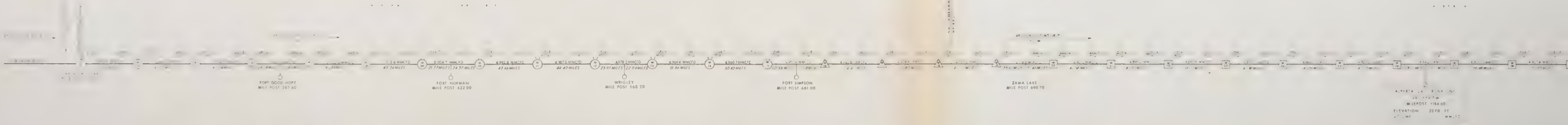
		M-01	M-02	TOTALS
1	STATION NUMBER			
2	STATION MILEPOST	39.20	96.40	
3	STATION ELEVATION (FEET)	670	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	[illegible]			
15	[illegible]			
16	[illegible]			
17	[illegible]			
18	[illegible]			
19	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
20	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

GAS SUPPLY LINES



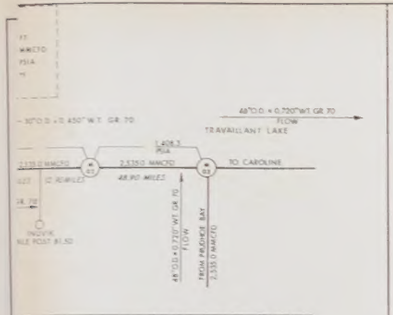
CAROLINE to KINGSGATE

		M-01	M-02	TOTALS
1	STATION NUMBER			
2	STATION MILEPOST			
3	STATION ELEVATION (FEET)			
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	[illegible]			
15	[illegible]			
16	[illegible]			
17	[illegible]			
18	[illegible]			
19	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
20	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

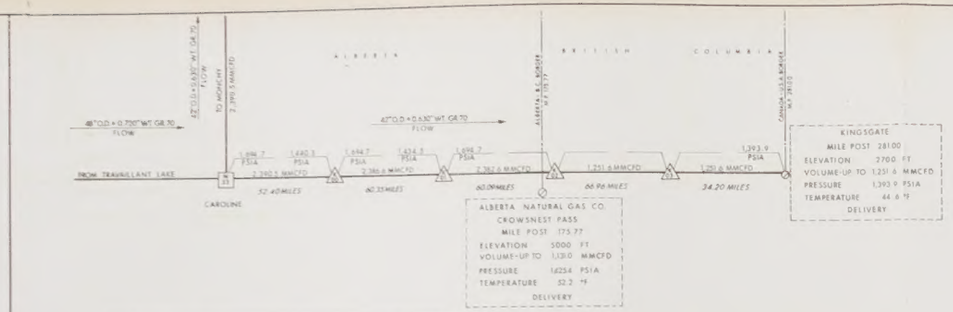


TRAVAILLANT LAKE to CAROLINE
MAINLINE

		M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
1	[illegible]																														
2	[illegible]																														
3	[illegible]																														
4	[illegible]																														
5	[illegible]																														
6	[illegible]																														
7	[illegible]																														
8	[illegible]																														
9	[illegible]																														
10	[illegible]																														
11	[illegible]																														
12	[illegible]																														
13	[illegible]																														
14	[illegible]																														
15	[illegible]																														
16	[illegible]																														
17	[illegible]																														
18	[illegible]																														
19	[illegible]																														
20	[illegible]																														
21	[illegible]																														



	M-01	M-02	TOTALS
	39.20	94.40	
	470	320	
SOR UNITS PROPOSED			
UNITS PROPOSED (ISO HORSEPOWER)			
DSEPOWER (ISO) PROPOSED			
DSEPOWER (ACTUAL) REQUIRED
(MMCFD)
TS
TION (MMCFD)
IN PRESSURE (PSIA)
AGE PRESSURE (PSIA)
N TEMPERATURE (°F)
AGE TEMPERATURE (°F)
PERATURE (°F)
TONS) REQUIRED
PRESSOR UNITS PROPOSED
SOR UNITS PROPOSED (ISO HORSEPOWER)
SOR HORSEPOWER (ISO) PROPOSED
OR HORSEPWER (ACTUAL) REQUIRED

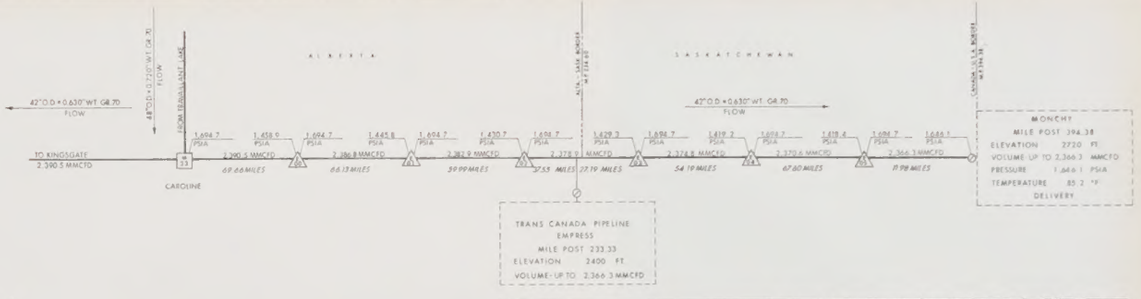


	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.64	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1			2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000			60,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	16,772	17,609			34,381
8	GAS VOLUME INTO STATION (MMCFD)	2,390.5	2,386.6			
9	STATION FUEL GAS (MMCFD)	3.9	4.0			7.9
10	GAS VOLUME OUT OF STATION (MMCFD)	2,386.6	2,382.6			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,436.7	1,430.8			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,702.2	1,702.5			
13	GAS COMPRESSION RATIO	1.180	1.190			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	43.5	48.7			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	66.9	72.0			
16	STATION OUTLET GAS TEMPERATURE (°F)	66.8	72.9			
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0			

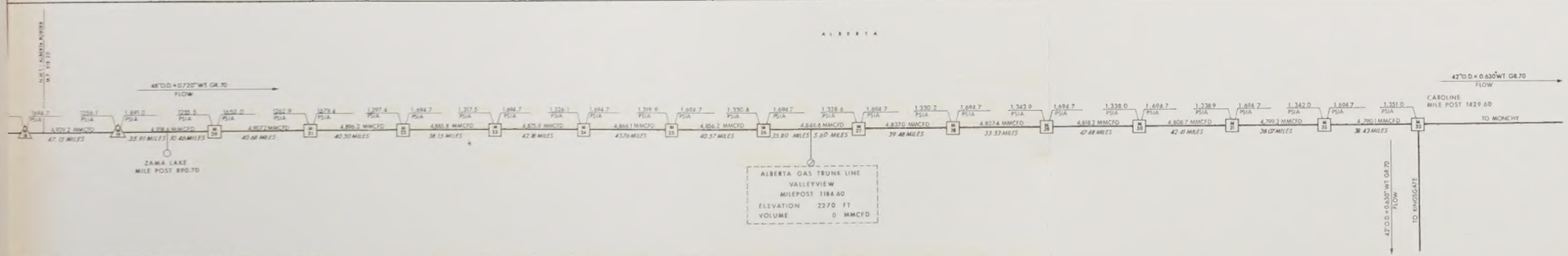
CAROLINE to KINGSGATE

GAS DELIVERY LINES

CAROLINE to MONCHY



	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	2310	2820	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	6
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	180,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,498	16,794	18,134	18,611	19,555	19,912	108,504
8	GAS VOLUME INTO STATION (MMCFD)	2,390.5	2,386.8	2,382.9	2,378.9	2,374.8	2,370.6	
9	STATION FUEL GAS (MMCFD)	3.7	3.9	4.0	4.1	4.2	4.3	24.2
10	GAS VOLUME OUT OF STATION (MMCFD)	2,386.8	2,382.9	2,378.9	2,374.8	2,370.6	2,366.3	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,455.3	1,442.2	1,427.0	1,425.5	1,415.3	1,414.3	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,702.3	1,702.5	1,702.6	1,702.8	1,702.8	1,702.9	
13	GAS COMPRESSION RATIO	1.170	1.180	1.190	1.190	1.200	1.200	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	44.5	49.2	51.9	56.8	59.0	63.0	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	66.2	72.3	76.8	82.1	85.6	89.8	
16	STATION OUTLET GAS TEMPERATURE (°F)	66.1	72.2	76.7	82.0	85.4	89.7	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0	0	0	0	0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0	0	0	0	0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0	0	0	0	0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0	0	0	0	0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0	0	0	0	0	



M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
2600	4000	3050	2850	2400	3850		3
1	2	2	2	2	2	47	4
27,500	27,500	27,500	27,500	27,500	27,500		5
55,000	55,000	55,000	55,000	55,000	55,000	1,330,000	6
31,193	49,363	50,967	50,522	49,665	48,184	1,422,682	7
4,827.0	4,827.4	4,818.2	4,808.7	4,799.3	4,790.1		8
9.6	9.2	9.5	9.4	9.2	9.1	289.0	9
4,827.4	4,818.2	4,808.7	4,799.3	4,790.1	4,781.0		10
1,322.2	1,337.0	1,331.0	1,337.0	1,335.2	1,344.7		11
1,706.1	1,708.0	1,708.1	1,708.0	1,707.9	1,707.8		12
1.290	1.280	1.280	1.280	1.280	1.270		13
40.3	39.4	42.4	41.7	40.7	41.2		14
73.8	73.4	77.3	76.4	75.0	74.2		15
60.3	60.3	60.2	60.2	60.1	60.0		16
9,196	8,451	10,925	10,341	9,488	9,188	281,202	17
						14	18
							19
						238,000	20
						139,959	21

TRAVAILLANT LAKE to CAROLINE

MAINLINE

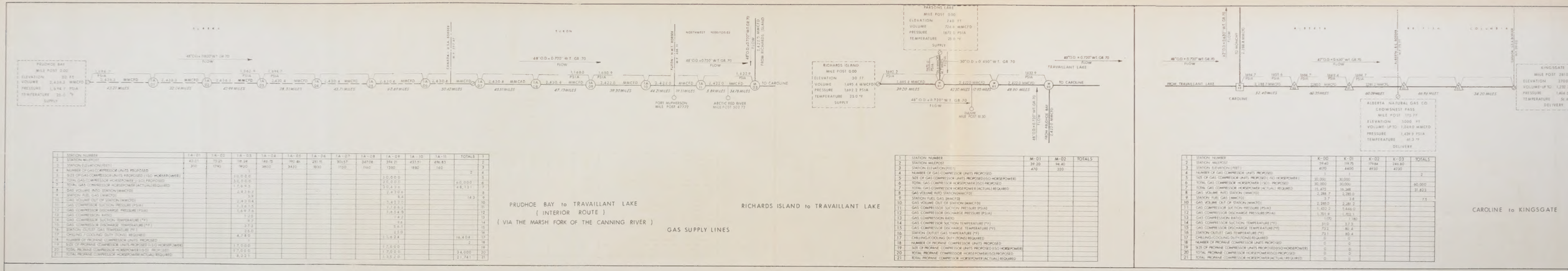
LEGEND

- PIPELINE
- STATION WITH CENTRIFUGAL-GAS TURBINE GAS COMPRESSION & CENTRIFUGAL-GAS TURBINE PROPANE COMPRESSION FOR GAS CHILLING
- STATION WITH CENTRIFUGAL-GAS TURBINE GAS COMPRESSION & GAS TO AIR DIRECT HEAT EXCHANGE FOR GAS COOLING
- STATION WITH CENTRIFUGAL-GAS TURBINE GAS COMPRESSION
- GAS MEASUREMENT STATION
- 1695 PSIA — PIPELINE PRESSURE
- 4323 MMCFD — GAS FLOWING VOLUME (14.73 PSIA & 60°F)
- SIDE VALVE FOR FUTURE DELIVERIES

INTERIOR ROUTE

VIA THE MARSH FORK OF THE CANNING RIVER

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED CALGARY ALBERTA ENGINEERS FOR CANADIAN ARCTIC GAS PIPELINE LIMITED	
DRAWN BY		
CHECKED BY	FLOW DIAGRAM	
ENGINEERS APPROVAL	MAXIMUM CAPACITY	SCALE
PROJECT MANAGER	AVERAGE WINTER CONDITIONS-OPERATING YEAR 5	DATE
		PROJECT No
		SECTION 1-9



PRUDHOE BAY to TRAVAILLANT LAKE
(INTERIOR ROUTE)
(VIA THE MARSH FORK OF THE CANNING RIVER)

GAS SUPPLY LINES

	STATION NUMBER	1A-01	1A-02	1A-03	1A-04	1A-05	1A-06	1A-07	1A-08	1A-09	1A-10	1A-11	TOTALS	
2	STATION MILEPOST	43.01	75.21	98.24	148.75	190.46	231.15	301.57	347.08	394.21	433.51	496.83		2
3	STATION ELEVATION (FEET)	300	1700	1900	3600	3420	1830	1120	1160	1380	1890	140		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED												2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			10,000						10,000				5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			10,000						10,000			40,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			7,643						10,439			48,131	7
8	GAS VOLUME INTO STATION (MMCFD)			2,439.3						2,430.4				8
9	STATION FUEL GAS (MMCFD)			9.0						9.8			143	9
10	GAS VOLUME OUT OF STATION (MMCFD)			2,430.4						2,420.6				10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			1,696.7						1,653.5				11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			1,697.6						1,654.5				12
13	GAS COMPRESSION RATIO			1.0						1.0				13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			40						40				14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			53.7						54.5				15
16	STATION OUTLET GAS TEMPERATURE (°F)			25.0						25.0				16
17	CHILLING/COOLING DUTY (TONS) REQUIRED			4,798						16,624			16,604	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED												2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			17,000						17,000				19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			17,000						17,000			34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			8,221						13,520			21,741	21

RICHARDS ISLAND to TRAVAILLANT LAKE

	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

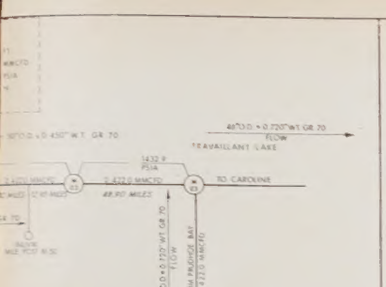
CAROLINE to KINGSGATE

	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	118.75	178.44	234.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4330	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000			60,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,473	15,348			31,823
8	GAS VOLUME INTO STATION (MMCFD)	2,288.7	2,280.0			
9	STATION FUEL GAS (MMCFD)	3.7	3.8			7.5
10	GAS VOLUME OUT OF STATION (MMCFD)	2,285.0	2,281.2			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,432.2	1,446.0			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,701.8	1,702.1			
13	GAS COMPRESSION RATIO	1.19	1.180			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	31.0	37.3			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	73.1	80.4			
16	STATION OUTLET GAS TEMPERATURE (°F)	73.1	80.4			
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0			

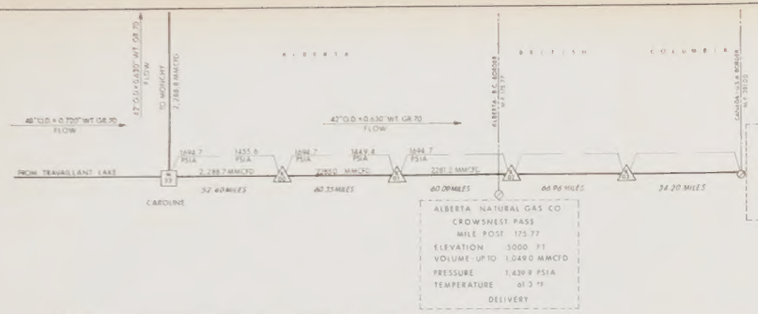
TRAVAILLANT LAKE to CAROLINE

MAINLINE

	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
2	STATION MILEPOST	126.50	177.70	229.62	262.86	290.00	334.83	400.23	446.37	489.83	534.23	583.14	629.00	679.42	726.79	750.82	807.64	854.79	901.16	941.94	982.14	1020.79	1062.42	1108.73	1148.80	1190.39	1228.68	1263.31	1296.69	1333.80	1397.17	1429.60		2
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1460	1440	1810	1100	1470	1790	2540	2370	1860	2130	2140	2600	4000	3050	2930	3400	3690		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																2	4	2		2		2	2	2		2		2	2	2		47	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500		5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	1,330,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	30,933	31,901	31,388	30,529	30,378	31,055	30,250	30,723	30,466	30,338	30,439	29,389	29,966	29,993	29,665	53,931	52,979	53,841	52,232	49,921	49,314	47,282	48,327	48,061	48,048	45,416	44,084	45,275	45,747	44,214	1,210,145	7
8	GAS VOLUME INTO STATION (MMCFD)	4,844.0	4,832.3	4,824.1	4,815.9	4,807.7	4,799.5	4,791.3	4,783.1	4,774.9	4,766.7	4,758.5	4,750.3	4,742.2	4,734.1	4,726.0	4,723.1	4,713.6	4,704.2	4,694.7	4,685.3	4,675.3	4,665.1	4,657.1	4,648.0	4,638.9	4,629.9	4,620.8	4,612.0	4,603.2	4,594.8	4,586.0	4,577.4	
9	STATION FUEL GAS (MMCFD)	11.7	8.3	8.2	8.2	8.2	8.5	8.5	8.2	8.2	8.2	8.2	8.1	8.1	8.1	8.1	9.3	9.3	9.3	9.4	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	8.8	8.7	8.8	8.8	266.8	9
10	GAS VOLUME OUT OF STATION (MMCFD)	4,832.3	4,824.1	4,815.9	4,807.7	4,799.5	4,791.3	4,783.1	4,774.9	4,766.7	4,758.5	4,750.3	4,742.2	4,734.1	4,726.0	4,723.1	4,713.6	4,704.1	4,694.3	4,684.7	4,675.3	4,666.1	4,657.1	4,648.0	4,638.9	4,629.9	4,620.8	4,612.0	4,603.2	4,594.8	4,586.0	4,577.4		10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,427.3	1,383.7	1,322.8	1,294.2	1,267.4	1,267.6	1,299.1	1,400.8	1,398.2	1,398.8	1,392.9	1,394.4	1,390.3	1,389.1	1,410.4	1,287.5	1,290.2	1,308.0	1,322.1	1,330.3	1,333.9	1,348.1	1,343.5	1,343.7	1,344.8	1,357.4	1,366.6	1,358.6	1,356.5	1,365.5		11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,705.6	1,689.6	1,700.4	1,699.2	1,704.0	1,704.1	1,704.8	1,704.9	1,700.2	1,700.4	1,693.4	1,690.2	1,688.0	1,685.4	1,687.4	1,690.0	1,701.1	1,695.9	1,702.7	1,707.6	1,707.5	1,707.8	1,707.4	1,707.4	1,707.3	1,707.1	1,707.1	1,707.1	1,707.1	1,707.0	1,707.0		12
13	GAS COMPRESSION RATIO	1.195	1.220	1.290	1.220	1.200	1.220	1.220	1.180	1.220	1.220	1.220	1.220	1.220	1.220	1.200	1.300	1.300	1.300	1.290	1.280	1.280	1.270	1.270	1.270	1.270	1.270	1.260	1.250	1.260	1.260	1.260		13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	16.3	3	2	6	-5	0.1	0.7	0.7	9.1	1.1	0.6	9	-3	-3.3	10.3	32.9	30.4	30.3	48.3	47.4	46.3	46.5	47.8	49.9	49	49.0	46.6	46.8	48.2	48.8	48.8		14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	39.2	24.2	24.2	22.6	23.7	24.4	23.9	24.7	24.1	23.8	24.6	25.6	23.5	23.6	33.0	51.7	55	68.9	87.4	84.3	82.4	80.3	79.2	81.7	82.6	82.8	82.8	79.8	78.1	80.3	81.2	80.3	
16	STATION OUTLET GAS TEMPERATURE (°F)	12.3	23.8	12.7	17.6	12.2	12.6	12.3	13.0	12.6	12.1	12.4	11.1	11.9	11.9	23.4	32.8	31.6	68.7	67.0	66.2	64.9	63.6	64.1	66.7	66.2	67.2	65.6	61.6	64.2	64.2	63.9	64.8	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	19,104	8,491	8,459	8,489	8,640	8,630	8,330	8,522	8,334	8,496	8,511	8,348	8,393	0	0	0	0	0	0	0	0	0	0	0	9,288	10,123	10,183	8,190	8,263	8,041	8,067	356,423	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED														0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	26,847	9,130	9,074	8,489	9,624	10,079	9,972	9,813	10,076	9,979	10,131	10,047	10,169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144,137	21



	M-01	M-02	TOTALS
	39.20	94.40	
	470	320	
...CK UNITS PROPOSED)			
...UNITS PROPOSED (ISO HORSEPOWER)			
...HORSEPOWER (ISO) PROPOSED			
...HORSEPOWER (ACTUAL) REQUIRED			
...(MMCFD)			
...ION (MMCFD)			
...N PRESSURE (PSIA)			
...RGE PRESSURE (PSIA)			
...N TEMPERATURE (°F)			
...RGE TEMPERATURE (°F)			
...ERATURE (°F)			
...TONS) REQUIRED			
...PRESSOR UNITS PROPOSED)			
...OR UNITS PROPOSED (ISO HORSEPOWER)			
...OR HORSEPOWER (ISO) PROPOSED			
...R HORSEPOWER (ACTUAL) REQUIRED			

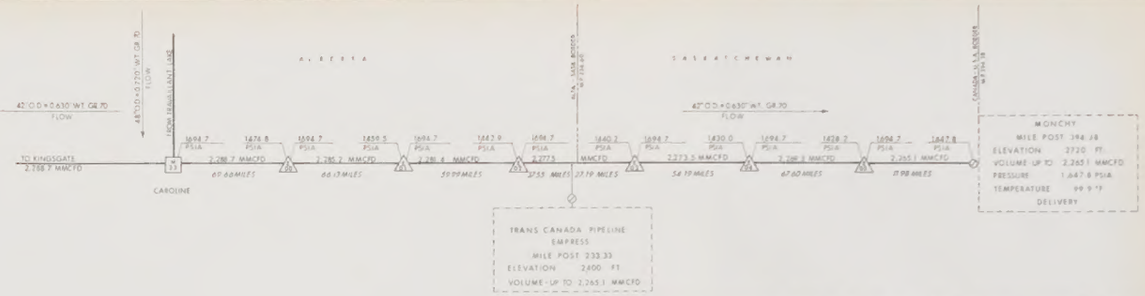


		K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER					
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4370	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1			2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000			60,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,475	16,348			31,823
8	GAS VOLUME INTO STATION (MMCFD)	2,288.7	2,285.0			
9	STATION FUEL GAS (MMCFD)	3.7	3.8			7.5
10	GAS VOLUME OUT OF STATION (MMCFD)	2,285.0	2,281.2			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,452.2	1,446.0			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,701.9	1,702.1			
13	GAS COMPRESSION RATIO	1.170	1.180			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	51.0	57.3			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	73.2	80.4			
16	STATION OUTLET GAS TEMPERATURE (°F)	73.1	80.4			
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0			

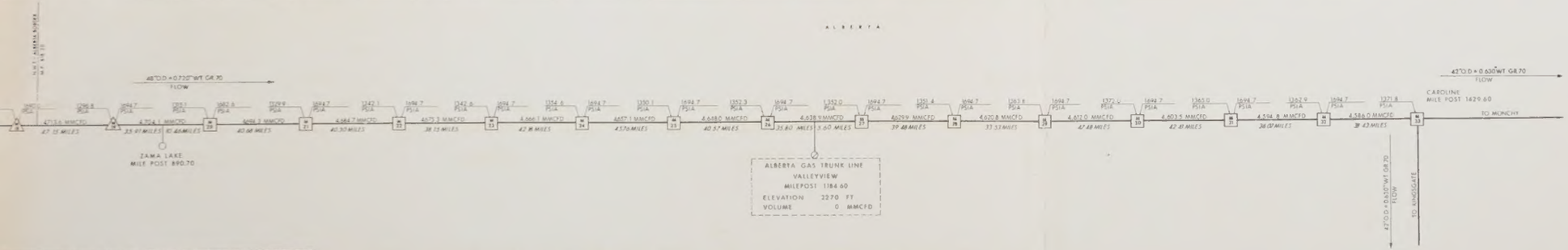
CAROLINE to KINGSGATE

GAS DELIVERY LINES

CAROLINE to MONCHY



		E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER							
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2280	2310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	6
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	180,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	14,249	15,754	17,281	17,914	18,898	19,346	103,442
8	GAS VOLUME INTO STATION (MMCFD)	2,288.7	2,285.0	2,281.4	2,277.5	2,273.5	2,268.3	
9	STATION FUEL GAS (MMCFD)	3.5	3.8	3.9	4.0	4.2	4.2	23.6
10	GAS VOLUME OUT OF STATION (MMCFD)	2,285.2	2,281.4	2,277.5	2,273.5	2,269.3	2,265.1	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,471.5	1,456.0	1,429.3	1,426.6	1,426.3	1,424.5	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,701.9	1,702.1	1,702.3	1,702.2	1,702.2	1,702.6	
13	GAS COMPRESSION RATIO	1.160	1.170	1.190	1.190	1.190	1.200	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	53.0	59.3	63.8	70.2	73.2	77.9	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	73.4	81.3	88.0	95.0	99.2	104.3	
16	STATION OUTLET GAS TEMPERATURE (°F)	73.3	81.5	87.9	94.9	99.2	104.4	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0	0	0	0	0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0	0	0	0	0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0	0	0	0	0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0	0	0	0	0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0	0	0	0	0	



	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60	
	3800	4000	3050	2950	3400	3800	
	2	2	2	2	2	2	47
	27,500	27,500	27,500	27,500	27,500	27,500	
	55,000	55,000	55,000	55,000	55,000	55,000	1,330,000
	45,416	44,084	42,379	45,747	44,236	1,320,685	
	4,629.8	4,612.0	4,603.5	4,594.8	4,586.0		
	9.8	9.3	8.7	8.8	8.6	266.6	
	4,620.0	4,612.0	4,603.5	4,594.8	4,586.0	4,577.4	
	1,344.8	1,357.4	1,366.6	1,358.6	1,356.5	1,365.5	
	1,707.3	1,707.1	1,707.1	1,707.1	1,707.1	1,707.0	
	1.270	1.260	1.250	1.260	1.260	1.250	
	49.0	46.6	46.8	48.2	48.8	48.9	
	82.6	78.8	78.1	80.3	81.2	80.3	
	65.6	61.6	64.2	66.2	65.8	64.8	
	1,123	10,183	8,190	8,242	9,041	9,067	256,423
	0	0	0	0	0	0	14
	0	0	0	0	0	0	
	0	0	0	0	0	0	238,000
	0	0	0	0	0	0	144,537

TRAVAILLANT LAKE to CAROLINE

MAINLINE

LEGEND

- PIPELINE
- STATION WITH CENTRIFUGAL - GAS TURBINE GAS COMPRESSION & CENTRIFUGAL - GAS TURBINE PROPANE COMPRESSION FOR GAS CHILLING
- STATION WITH CENTRIFUGAL - GAS TURBINE GAS COMPRESSION & GAS TO AIR DIRECT HEAT EXCHANGE FOR GAS COOLING
- STATION WITH CENTRIFUGAL - GAS TURBINE GAS COMPRESSION
- GAS MEASUREMENT STATION
- 16.73 PSIA — PIPELINE PRESSURE
- 4523 MMCFD — GAS FLOWING VOLUME (16.73 PSIA & 60°F)
- SIDE VALVE FOR FUTURE DELIVERIES

INTERIOR ROUTE

VIA THE MARSH FORK OF THE CANNING RIVER

DESIGNED BY	
DRAWN BY	
CHECKED BY	
ENGINEERS APPROVAL	
PROJECT MANAGER	

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR

CANADIAN ARCTIC GAS PIPELINE LIMITED

FLOW DIAGRAM

MAXIMUM CAPACITY

AVERAGE SUMMER CONDITIONS-OPERATING YEAR 5

SCALE
DATE
PROJECT No.

SECTION 1-10

REV